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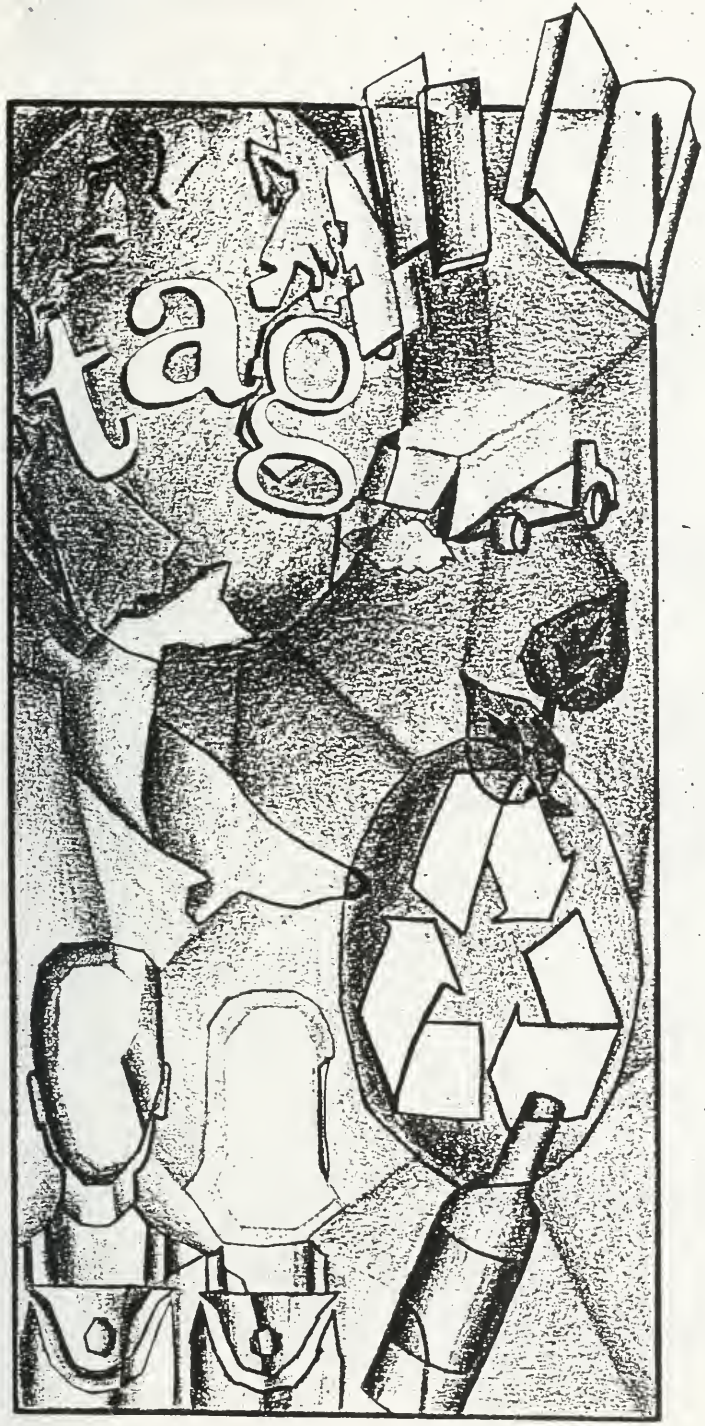


# Teaching About Garbage

MODULE 3
THE TRANSITION YEARS

Produced by:
Environment
Environnement
Ontario

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Également disponible sous le titre: *La poubelle histoire du monde, Les années de transition, module 3.*

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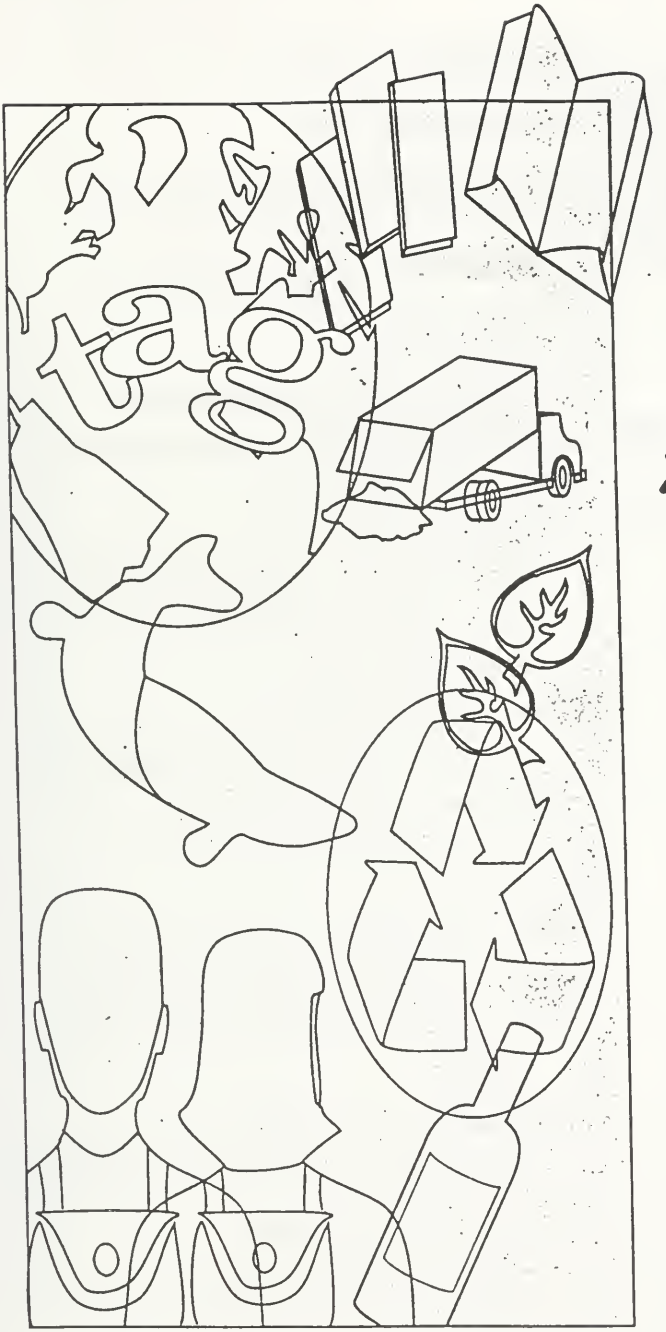

# Teaching About Garbage

MODULE 3

THE TRANSITION YEARS

Produced by:

Ontario Environment Environnement

Consultants:

Courseware Solutions Inc.

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# Overview

## Purpose

*Teaching About Garbage*, or TAG, is a waste management education program developed by the Ontario Ministry of the Environment in partnership with the Ministry of Education.

When complete, TAG will consist of six modules for use in Ontario's school system. TAG Modules 1 (grades K-3) and 2 (grades 4-6) have been developed and released for use. This module is the third in the series and is intended for use by students in the Transition Years (grades 7-9).

## Objectives

The overall objectives of TAG 3 are:

- to provide students with the information they need to make responsible choices to reduce waste, and
- to help students develop attitudes and lifestyles which will result in a commitment to a conserver ethic and a sustainable quality of life.

## Educational approach

TAG 3 is designed to integrate waste management topics into a broad spectrum of subject areas, including language, science, social studies, and the arts. The activities are closely tied to the Ontario curriculum for grades 7 to 9, as indicated in the two tables that follow: Curriculum Links Table and Transition Years Links. Each activity has been designed to incorporate a cross-curricular approach.

TAG 3 is activity-based and student-centered, consisting of a set of 22 student activities and 11 independent learning projects. The activities may be done in any order. TAG 3 is not meant to be comprehensive, but rather to complement other waste management materials that are available to Ontario schools. Some of these other materials are included in the List of Resources or the *Pick Your Own* project on page 78.

# Curriculum

| Activity title & page reference | English Drama, role playing | English Investigating, interviewing | English Reading, reading aloud | English Small group interaction | English Writing, recording, reporting | Geography 7/8 PHYSICAL Core 1 – Our Unique Community | Geography 7/8 PHYSICAL Core 3 – Resources | Geography 7/8 HUMAN Core 1 – Patterns in Community | Geography 7/8 HUMAN Core 3 – Manufacturing | Geography 9 Canada Studies Core 3 – Natural Resources | History 7 Early Canadian Communities |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gather resource material about garbage, p. 8 | | ✓ | | | | | | | | | |
| Do a waste audit, p. 10 | | | | | | | ✓ | | | | |
| Change a bad habit, p. 12 | | | | | | | ✓ | | | | |
| List items used by a typical student, p. 14 | | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | |
| Perform a play about garbage, p. 16 | ✓ | | ✓ | | ✓ | | | | | ✓ | |
| Map a product's "life journey", p. 20 | | | | ✓ | | | ✓ | ✓ | ✓ | | |
| Build a flowchart of a product life cycle, p. 22 | | | | ✓ | | | ✓ | ✓ | ✓ | | |
| Simulate a product life cycle, p. 26 | ✓ | | | | | | ✓ | ✓ | ✓ | | |
| Map locations of paper mills, p. 30 | | | | | | | ✓ | ✓ | ✓ | | |
| Observe leaves in a compost heap, p. 32 | | | | | ✓ | | | | | | |
| Observe & identify compost animals, p. 36 | | | | | | | | | | | |
| Examine smaller compost animals, p. 40 | | | | | | | | | | | |
| Research the local landfills, p. 44 | | ✓ | | | ✓ | | | ✓ | | | |
| Decide whether a landfill should be built, p. 46 | | | | ✓ | | | | ✓ | | ✓ | |
| Role play some dilemmas, p. 52 | ✓ | | ✓ | ✓ | | | | ✓ | | | |
| Write a plot outline for a 3Rs TV episode, p. 54 | ✓ | | | ✓ | ✓ | | | ✓ | | | |
| Write a script for a 3Rs TV episode, p. 56 | ✓ | | | ✓ | ✓ | | | ✓ | | | |
| Use percents & graphs with waste statistics, p. 58 | | | | | | | | | | | |
| Form a hazardous waste events chain, p. 60 | | | | | | ✓ | | | | | |
| Survey the community about a local issue, p. 64 | | | | | ✓ | ✓ | | ✓ | | | |
| Make signs for community garbage cans, p. 68 | | | | | | ✓ | | ✓ | | | |
| Write a book report, p. 70 | | | ✓ | | ✓ | ✓ | | ✓ | | | |

# Links Table

| History 8 Building the Canadian Nation | History 9 Canada in the 20th Century | Mathematics 7 Percent | Mathematics 8 Organization & Rep. of Data | Mathematics 9 Statistics | Science 7 Core Unit 1 The Nature of Science | Science 7 Core Unit 2 Char. & Class. of Living Things | Science 7 Core Unit 4 Conservation of Energy | Science 8 Core Unit 4 Soil & Plant Ecology | Science 9 Science in Society | Science 9 Food and Energy | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | English – Grammar, Punctuation, Spelling |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | English – Reading diagrams, independent learning |
| | | | | | | | | | | | Math 8 – Flowcharts |
| | | | | | | | | | | | |
| | | | | | | | | | | | Geo. 9 –The Built Environment Opt. Unit 1, Canada at Work |
| | | | | | | | | | | | Science 9 – Green Plants |
| | | | | | | | | | | | |
| | | | | | | | | | | | Science 9 – Cells and Cell Systems/Functions |
| | | | | | | | | | | | English – Using Resources |
| | | | | | | | | | | | Geo. 9 – The Built Environment Opt. Unit 4, Locality Studies |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | English – Technology in the classroom |
| | | | |  | | | | | | | |
| | | | | | | | | | | | Geo. 7/8 PHYSICAL Opt. Unit 2, River Systems |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

# Transition Years Links

| Activity title & page reference | Arts | Language | Science, Mathematics & Technology | Self and Society | Technological Competence | Thinking, Acting & Reflecting | Environmental & Global Perspectives | Personal & Social Well-being | Communication | Aesthetics |
|---|---|---|---|---|---|---|---|---|---|---|
| Gather resource material about garbage, p. 8 | | ✓ | | | | | | | ✓ | |
| Do a waste audit, p. 10 | | | | ✓ | | ✓ | ✓ | ✓ | | |
| Change a bad habit, p. 12 | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| List items used by a typical student, p. 14 | | | | ✓ | | ✓ | | | | |
| Perform a play about garbage, p. 16 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | |
| Map a product's "life journey", p. 20 | | | | ✓ | | ✓ | ✓ | | | |
| Build a flowchart of a product life cycle, p. 22 | | | | ✓ | | ✓ | ✓ | | | |
| Simulate a product life cycle, p. 26 | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | |
| Map locations of paper mills, p. 30 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| Observe leaves in a compost heap, p. 32 | | | ✓ | | | ✓ | | | | |
| Observe & identify compost animals, p. 36 | | | ✓ | | | ✓ | | | | ✓ |
| Examine smaller compost animals, p. 40 | | | ✓ | | | ✓ | | | | ✓ |
| Research the local landfills, p. 44 | | ✓ | | ✓ | | | | | ✓ | |
| Decide whether a landfill should be built, p. 46 | | | | ✓ | | ✓ | ✓ | ✓ | | |
| Role play some dilemmas, p. 52 | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | |
| Write a plot outline for a 3Rs TV episode, p. 54 | ✓ | | | | | | ✓ | ✓ | ✓ | |
| Write a script for a 3Rs TV episode, p. 56 | ✓ | | | | | | ✓ | ✓ | ✓ | |
| Use percents & graphs with waste statistics, p. 58 | | | ✓ | | | | | | ✓ | |
| Form a hazardous waste events chain, p. 60 | | | ✓ | | | | ✓ | | | |
| Survey the community about a local issue, p. 64 | | ✓ | | ✓ | | | | ✓ | ✓ | |
| Make signs for community garbage cans, p. 68 | ✓ | | | | | | | ✓ | ✓ | ✓ |
| Write a book report, p. 70 | | ✓ | | | | ✓ | ✓ | | ✓ | |

# Activities

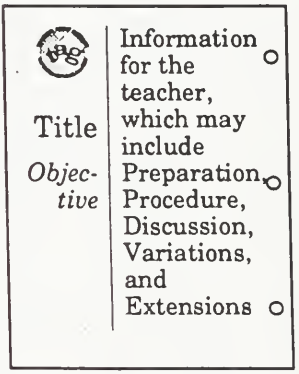
## Subject & grade level

The activities that follow are designed for use in grades 7 to 9. More detailed information on grade levels and ties to particular subjects may be found in the preceding Curriculum Links and Transition Years Links tables.

## Format

With the exception of *List items used by a typical student*, each activity consists of a Teacher Page, followed by one or more Student Pages.

Each Teacher Page is an even-numbered, left-hand page, laid out as follows:




The first page of each activity is the TEACHER page.

With the exception noted, the balance of the pages for a given activity are Student Pages, designed to be copied and distributed to students doing the activity. There are usually one or three Student Pages per activity.

To further distinguish Student Pages from Teacher Pages, a different font is used, all printing is in black, except for the page number, which is intended to "disappear" when the student pages are reproduced, and the following logo appears in the top left corner:

TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Gather resource material about garbage

*To locate information and resources in the school and write letters requesting information*

## Preparation

Check if this activity has already been done in your school.

Make the list on the next page available to the class. All of the resources are available free. You may wish to have a brainstorming session on locating information and resources prior to distributing the list.

## Procedure

**1.** Divide the class into small groups, each responsible for some of the listed resources.

**2.** Using their research skills, students search the school for their assigned items. Stress that in keeping with the 3Rs, it is important to find out if a resource is already in the school – if it is, it should be REUSED.

**3.** If some items cannot be found in the school, the group **writes a letter** requesting the materials. If available, a computer and printer should be used.

Each group reviews another group's letter, before it is sent, for clarity, grammar, spelling, and correctness of addresses (don't forget the return address).

**4.** Keep a copy of the letter. If materials don't arrive after a month, write a follow-up letter.

**5.** The class assembles the Garbage Resource Collection, or, if the collection already exists, arranges to borrow, share, or use it.

**6.** Students should **skim the resources**, so that they will be able to identify them as appropriate information sources for later activities.

REDUCE
REUSE
RECYCLE

# Collecting Resources

*Available from:*
**Environment Canada**
**Inquiry Centre**
**351 St. Joseph Boulevard**
**Hull, Québec K1A 0H3**

- ❑ What We Can Do For Our Environment (booklet)

*Available from:*
**Ministry of Natural Resources**
**Public Information Centre**
**Whitney Block, Queen's Park**
**Toronto, ON M7A 1W3**

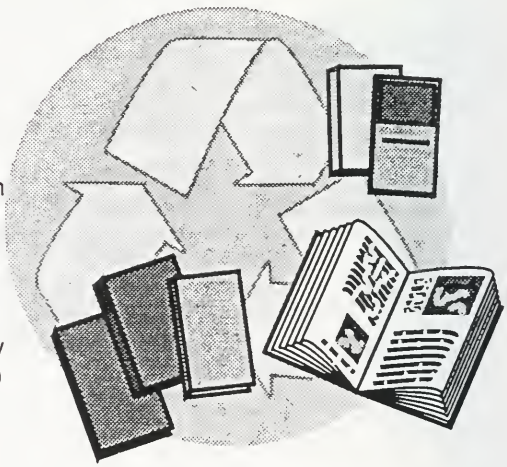
- ❑ Ontario: Sustainable Forestry in Ontario, Tabloid, #4728 (large brochure)

*Available from:*
**Ministry of the Environment**
**Public Information Centre**
**135 St. Clair Avenue West**
**Toronto, ON M4V 1P5**

- ❑ Captain Conserver Poster
- ❑ Closing the Loop, The 3Rs of Waste Management (booklet)
- ❑ The Earth Times (newspaper)
- ❑ Hazardous Wastes in Your Home (brochure)
- ❑ Incineration of Garbage (information sheet)
- ❑ The Landfilling of Garbage (information sheet)
- ❑ The Road to a Conserver Society (booklet)
- ❑ Solid Waste Management: A Glossary of Terms (glossary/information sheets)

*Available from:*
**Waste Reduction Info. Service**
**Recycling Council of Ontario**
**489 College Street, Room 504**
**Toronto, ON M6A 1G5**

- ❑ The Blue Box Program Recyclable Materials (recycling information sheets)
- ❑ Fine Paper Recycling (information sheet)



TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Do a waste audit

*To identify a student's strengths and weaknesses in waste management habits*

## Evaluation

This activity can be used as an evaluation tool to measure changes in a student's waste management habits.

Do this activity early in the year and save the results. Do the same waste audit later in the year and compare the results.

## Procedure

**1.** Distribute copies of the waste audit to each student.

**2.** Students **complete the waste audit.**

**3.** Students **score and total the results** by counting 4 points for each *Always* selected, 3 points for *Sometimes*, 2 points for *Rarely*, and 1 point for *Never*.

**4.** For each item and the total, students **calculate the class mean, median, and mode.**

**5.** Students compare their individual results with the class results and **identify items revealing the need for improvement.**

## Extensions

- Students administer the waste audit to another class and provide them with a class *waste profile*.
- Students administer the survey to members of their family and come up with a family waste profile.
- Students put the survey on the computer and either use an existing program or write a computer program to tally the scores.

REDUCE
REUSE
RECYCLE

# How wasteful are you?

Name:_____ Date:_____

| | always | sometimes | rarely | never |
|---|---|---|---|---|
| 1. I buy only things I really need. | ❑ | ❑ | ❑ | ❑ |
| 2. I use my own bag for purchases I make. | ❑ | ❑ | ❑ | ❑ |
| 3. I use both sides of a sheet of paper where possible. | ❑ | ❑ | ❑ | ❑ |
| 4. I repair things instead of throwing them away. | ❑ | ❑ | ❑ | ❑ |
| 5. I exchange books, videos, and cassettes with friends instead of buying new ones. | ❑ | ❑ | ❑ | ❑ |
| 6. I avoid buying products with extra packaging. | ❑ | ❑ | ❑ | ❑ |
| 7. Our household uses environment-friendly cleaning products. | ❑ | ❑ | ❑ | ❑ |
| 8. Our household recycles newspapers. | ❑ | ❑ | ❑ | ❑ |
| 9. Our household recycles glass bottles and cans. | ❑ | ❑ | ❑ | ❑ |
| 10. I buy recycled products whenever possible. | ❑ | ❑ | ❑ | ❑ |

| | always | sometimes | rarely | never |
|---|---|---|---|---|
| 11. Our household composts. | ❑ | ❑ | ❑ | ❑ |
| 12. We buy in bulk. | ❑ | ❑ | ❑ | ❑ |
| 13. I give away my old clothes. | ❑ | ❑ | ❑ | ❑ |
| 14. I dispose of any hazardous wastes (batteries, art supplies, etc.) safely. | ❑ | ❑ | ❑ | ❑ |
| 15. If I bring my lunch to school, it's a litterless one. | ❑ | ❑ | ❑ | ❑ |
| 16. I use rechargeable batteries instead of disposables. | ❑ | ❑ | ❑ | ❑ |
| 17. I reuse containers and wrappings instead of throwing them away. | ❑ | ❑ | ❑ | ❑ |
| 18. I use reusable dishes, cups, etc. instead of disposable ones. | ❑ | ❑ | ❑ | ❑ |
| 19. Before throwing anything away, I think about how it might be reused. | ❑ | ❑ | ❑ | ❑ |
| 20. I remind other household members about the 3Rs. | ❑ | ❑ | ❑ | ❑ |

TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Change a bad habit

*To discover specific steps that each student can take to change a bad waste management habit*

## Preparation

Copy and distribute the habit change worksheet to each student or to pairs of students.

## Procedure

**1.** Discuss the steps involved in changing a habit. Following the steps in the worksheet, **work through an example with the students** before they work on their own.

**2.** Possibly based on the results of the Waste Audit, **each student identifies a waste management habit they would like to change**. Some examples are: crumpling and throwing out paper, throwing pop cans in the garbage, not taking a bag to the store.

**3. Students work through the steps** presented in the sample worksheet, **writing up their own plan** in as detailed a fashion as possible. A timeline should be included as well as a way of monitoring and evaluating their success.

**4.** Students pair off so that they can review each other's plans for habit change, and act as each other's monitor.

## Extensions

- Student pairs write a **follow-up report** on the success of their plans, emphasizing what they would do differently next time.

- Students set up an **advice service** to help family members or friends change waste management habits. If there is a school newspaper, students include an advice column in it. Students think up an appropriate name for their service (e.g. *Waste Watchers, Dr. 3Rs*).

REDUCE
REUSE
RECYCLE

# Changing a Habit

## *Sample Worksheet*

**GOAL**

Habit you want to change:

Your goal:

**ANALYSIS**

Analyze your habit by asking these five **W** questions:

**W**here are you most often when the habit occurs?

**W**hen does the habit occur?

**W**hat happens immediately before it?

**W**ho is around you?

**W**hy do you do it?

**ACTION PLAN**

Look at your answers to the five W questions. For each of the Ws, write down reminders or things you could do to change the circumstances leading up to your habit. Write down a schedule of when you're going to do them. These can become your **mini-goals**. Check off when you've reached these mini-goals.

**MONITOR & REWARD**

Now that you are aware of the details of your habit, it should be easier to control it and change it. To start with, try to **change your behaviour for a limited time period** (4 hours, 1 day, 1 week). Keep extending the time.

**It is very important to monitor your progress.** Each day, for at least a week, set aside a few minutes to record (on scrap paper, of course) how you're doing. At the end of a few weeks or a month, **set aside a time to review your behaviour.** If you're having trouble, backtrack to earlier steps.

**Reward yourself when you reach a goal** – either when you reach a mini-goal or if you successfully change your habit over a limited time period.

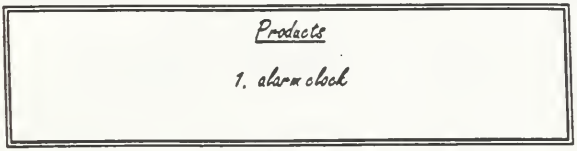
TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# List items used by a typical student

*To increase awareness of the large number of products that our society consumes*

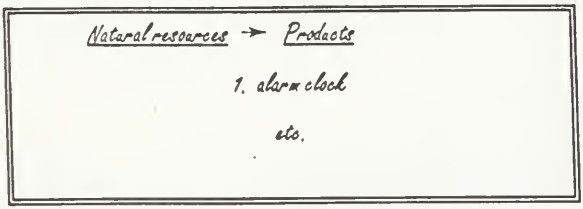
## Procedure

**1.** Ask the class to **think of every product they might use** or consume, from morning to night. Choose a "morning" item, and start a numbered list on the chalkboard.



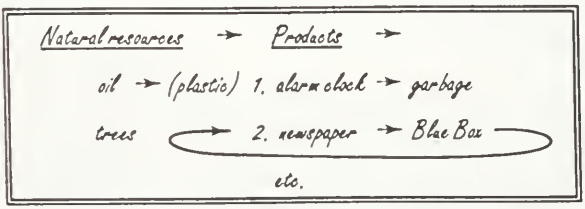

**2. Each student adds to the list.** After everybody takes a turn, ask for estimates of the length of a complete list.

**3.** Write "Natural resources" to the left, with an arrow toward the list.




Ask students to **name the natural resources** used for each product and list several.

**4.** Draw an arrow to the right and ask, "When you're done with the item, is there anything left, and if so, where does it go?" Include food scraped from plates, packaging, etc.




**List the destinations** to the right. For a compost heap or recycling program, draw a curved arrow leading back to the left of the product list, since the product becomes a resource again.

## Discussion

**1.** If the *Gather resource material about garbage* activity on page 8 was done, have students get the two booklets, *The Road to a Conserver Society* and *Closing the Loop, The 3Rs of Waste Management*, otherwise, provide copies.

Have students **read aloud** the title and first page of each booklet – each student reads a paragraph and passes the booklet to the next reader. Ask the rest of the class to note the main points.

**2.** Ask students to **state some of the main points**: "We throw away a lot," "Things were different in the past," "Natural resources are being used up," etc. How do they relate to the list on the board? What problems are illustrated by the length of the list?

**3.** What is an open-loop system, according to *Closing the Loop*? **Which arrows on the board show open-loop systems, which closed?** How does a closed loop reduce resource depletion and waste?

**4.** Review the chalkboard list. How would a list made when your grandparents were your age differ? Which items would be the same? Which would be used for the same purposes but would be made of different materials? How would a list for the early European settlers differ? How would the differences affect the amount of natural resources used and the amount thrown away?

## Extension

The next activity, *Perform a play about garbage*, the project *Garbage Through the Ages* on page 73, and the *Values* activity in the Recycling Council of Ontario's Waste Reduction and Recycling Curriculum Package (see List of Resources) focus on the conserver habits of earlier times.

**"Each year the average Canadian uses 18 000 kg of petroleum, coal, natural gas, and uranium to produce goods, fuel, and heat... Most of these resources are used in the manufacture of a product that is used once, then discarded."**

*The Save-It Kit*
*Environment Canada*

# Perform a play about garbage

*To give students a historical perspective on waste management in society, and an appreciation of the difference between a consuming society and a conserving society*

## Preparation

*The Tradition of Trash*** has a cast of 19 and a "chorus." In its current state, the play takes approximately 10 minutes to perform.

## Procedure

1. Assign students to the roles.
2. Students memorize their lines, gather appropriate costumes and props, and have rehearsals.
3. Students perform the play.
4. After performing the play, use the Discussion Sheet as a basis for comparing societies in terms of how they dealt with and defined garbage.

## Variations

- Students make the play longer by **composing more verses for the current roles, writing a new chorus, or by writing new characters into the play**. The book *Throwing Things Away: From Middens to Resource Recovery* by Laurence Pringle is a good source of material for additional characters from the past. Characters from the future, or characters from other cultures can be written in as well.
- Students modify the play and perform it as a rap.

## Extensions

- Perform the play for another class.
- Set the play or rap to music.
- Videotape the play.

** *The Tradition of Trash* is based on the play *Garbage Through the Ages*, contained in the Solid Waste Management Education Kit published by Metropolitan Toronto Works Department.

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# The Tradition of Trash

*Appropriate costumes and props are recommended.*

***Person 1 - Narrator***

This is a tale of people throughout history
Who all have a problem, as you will soon see –
What shall they do with their garbage and trash?

***All***

*Why, throw it! Or bury it! Or burn it to ash!*

***Person 2 – Cave Dweller (30 000 BC)***

I am a cave dweller who lives on the ground.
What do I do with old stuff all around?
I burn it up – burn it up in the fire.
And I bury the bones in the muck and the mire.
If things get too cluttered around my feet,
I just move to a new cave and hunt for more meat.

***Person 3 – Cave Dweller #2 (20 000 BC)***

The archeologists call my garbage piles "middens."
They have bones and other old artifacts in them.
To us, they're trash; they're of no use.
They'll be found years later – it will be big news.
It's through our trash that we've made you aware
Of the fact that we were ever there.

***All***

*Yes, throw it, or bury it, or burn it to ash!*
*That's how we always get rid of our trash!*

***Person 4 – from Mahenjo-Daro, Indus Valley (2000 BC)***

I'm from a town in what you now know as India.
The year is 2000 B.C.
I'm very advanced when it comes to trash,
As I'm sure you'll agree.
Our ancient town is, in some ways, like yours.
Our homes have garbage bins inside the doors.
We were the first to build our dwellings with plans
For garbage chutes, sewers, and built-in trash cans.

***Person 5 – Greek (500 BC)***

In Athens, our trash piles up under our feet
Until a law is passed saying, "No garbage in the street!"
So we start a dump out of town by a mile
Where we can throw our trash, forget it, and smile!

***Person 6 – Roman (400 BC)***

I am a Roman who lives in town.
No problem with waste – I just throw my trash down.
We build houses and roads on top of it all,
But now our old towns are getting too tall.
Later, we'll build sewers and aqueducts too.
But what to do with our garbage, we never really knew.

***Person 7 – from China (5 BC)***

Records show that in early China, we keep our streets clean.
We have special "garbage police" on the scene.
They make sure dead animals are taken away
And check that the streets are swept every day.

***Person 8 – Briton (1300 AD)***

I am a Briton and not very neat.
I throw my trash right onto the street.
The rats and pigs, they have a feast
And spread bacteria and disease.
Our trash will stay until the next rain,
Or until our fair London burns down again.

***All***

*Oh, what do we do with our garbage and trash:*
*We throw it, or bury it, or burn it to ash!*

***Person 9 – Explorer (1500)***

I am an explorer – to the Americas I sail.
Garbage is no problem, compared to a gale.
I toss my trash out into the sea;
It disappears, and never bothers me.

***Person 10 – Settler (1800)***

I am the settler. I make everything by hand.
I don't throw out much; I use all that I can.
Cloth scraps become quilts; I reuse my bent nails.
It will be a long time 'fore the next trade ship sails.

***Person 11 – Industrialist (1900)***

I'm the industrialist and new on the scene,
I mass-produce goods with my trusty machine.
This sweater, handmade, takes a week or more.
But now, in one hour, I can make twenty-four.
I make things so cheaply, you can now afford two,
And discard twice as much trash as you need to do.

***Person 12 – Person of the 1920s***

It's the roaring twenties and just call me a grump.
It's awful living next to an open dump.
They smolder and smell and grow bigger in size.
They're full of pests and rodents and flies.
Let's try incinerators and send our trash up in smoke.
But will that make us cough and choke?

***All***

*What are we still doing with garbage and trash?*
*We throw it away, or bury it, or burn it to ash!*

***Person 13 – Scientist (1950)***

I am the scientific person in the new post-war age.
We've learned a few tricks while the war shortage raged.
We've invented synthetics and plastics with haste.
And in the process created hazardous waste.

***Person 14 – Person of the 1970s***

I am a modern person, using everything with ease.
Plastic cups, paper plates – anything I please.
We've got lots of landfills to store all this waste.
What we throw away, just gets replaced.

***Person 15 - Person of the 1980s***

It's the booming 80s and consuming is 'in'.
The media says "Buy! Head for the bargain bin!"
We buy TVs, cars, and appliances too.
Why pay for repair, when you can buy it new?
We eat instant meals that come in a pack.
You just boil the food in its own plastic sack.
Or our TV dinner in its tinfoil tray:
It's quick; you don't wash it; just throw it away!

***All***

*It's the New Thing, the NEW that Canada craves.*
*Just send the old stuff away to its grave.*
*So what if there are more of us buying more goods?*
*So what if they won't rot away as they should?*

***Person 16 (Native Canadian)***

Now wait just a minute! You cannot fail
To include me in your historic trash tale.
My people lived simply, on prairies, in woods.
We made no high trash piles, nor mass-produced goods.
Let me be your critic, show you where you stand;
And tell you just how you're defiling our land.

***Person 17 (Native Canadian #2)***

Your new-fangled goods will not rot away.
When you throw them all down, they remain where they lay.
Then you say you will bury them deep in the ground.
All your garbage will make quite a mound!
So then you burn it, in smoldering masses
And fill up our air with smoke and harsh gases.
All of your answers have faults everywhere
You'll ruin the water, the land or the air.
Our resources are dwindling – our lumber, our ore –
And our planet Earth can't keep making more.

***Person 18 - Person of the 1990s***

You're right. Our resources are shrinking away
While our garbage problem grows bigger each day.
We keep on converting resources to waste.
We forget to conserve in our consuming haste.

***Person 19 - Person #2 of the 1990s***

It's time we progress past the Disposal Age
And make the three Rs the popular rage!
We'll have to give up old solutions for trash
And all realize that it's pure balderdash – to just

***All***

*Throw it, or bury it, or burn it to ash!*

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# Consuming vs. Conserving Society

## *Discussion Sheet to accompany the play, The Tradition of Trash*

*Use the chart below as a basis for a discussion of how societies through the ages fit the consuming or conserving model of waste management.*

| Conserver Principles** | Consuming Society | Conserving Society |
|---|---|---|
| Conservation of resources | • gradual exhaustion of raw materials | • minimum use of materials and energy in the goods produced and in the packaging and delivery systems |
| Durability of products | • cheap and convenient products with a short life span | • durable goods that can be maintained and repaired |
| "True cost" | • mass production of goods without consideration of social or environmental factors and costs | • recognition and assessment of all costs involved in product development |
| Responsibility | • reliance on others to solve waste problems | • personal, business, community, and government responsiblity to reduce, reuse, recycle leading to self-sufficiency |
| Planning | • emphasis on short-term needs and goals | • concern for the future, long-range planning |

** taken from *The Road to a Conserver Society*, Ontario Ministry of the Environment, 1991 listed in "Gathering Resource Material" activity

### Other questions for discussion:

How does population density affect waste management?
What is the relationship between a society's wealth and its waste problems?

# Map a product's "life journey"

*To increase awareness of the natural resources and energy used, and the waste generated, by everyday consumption*

## Preparation

Provide map pins and yarn, or a marker pen.

Display two maps: an Ontario road map and a map with Ontario, Labrador, and West Virginia; and *The Life Journey of One Steel Can* (page 21), explaining that this is just one possible journey.

## Procedure

1. Pairs of students **mark locations from the journey on the appropriate map**. Students should choose the nearer beverage company location (Mississauga or Ottawa), write in actual locations in place of the question marks, and draw the applicable line between the used can and the next step (either recycling or landfill).

2. After marking all locations, pairs use yarn or marker to **trace likely transportation routes** between points.

## Discussion

1. Consider each location and leg of the journey. What energy is consumed and waste generated?

2. **Did the line drawn after the used can create a closed or an open loop?** Recall that open loops are associated with consumer societies and closed loops with conserver societies.

3. Imagine the journeys of all the products used by everybody, the energy and natural resources used, and the traffic and waste generated.

## Extension

❦ Small groups research and map the life journey of other products, such as a newspaper (see List of Resources and the recycling information sheets listed on page 9).

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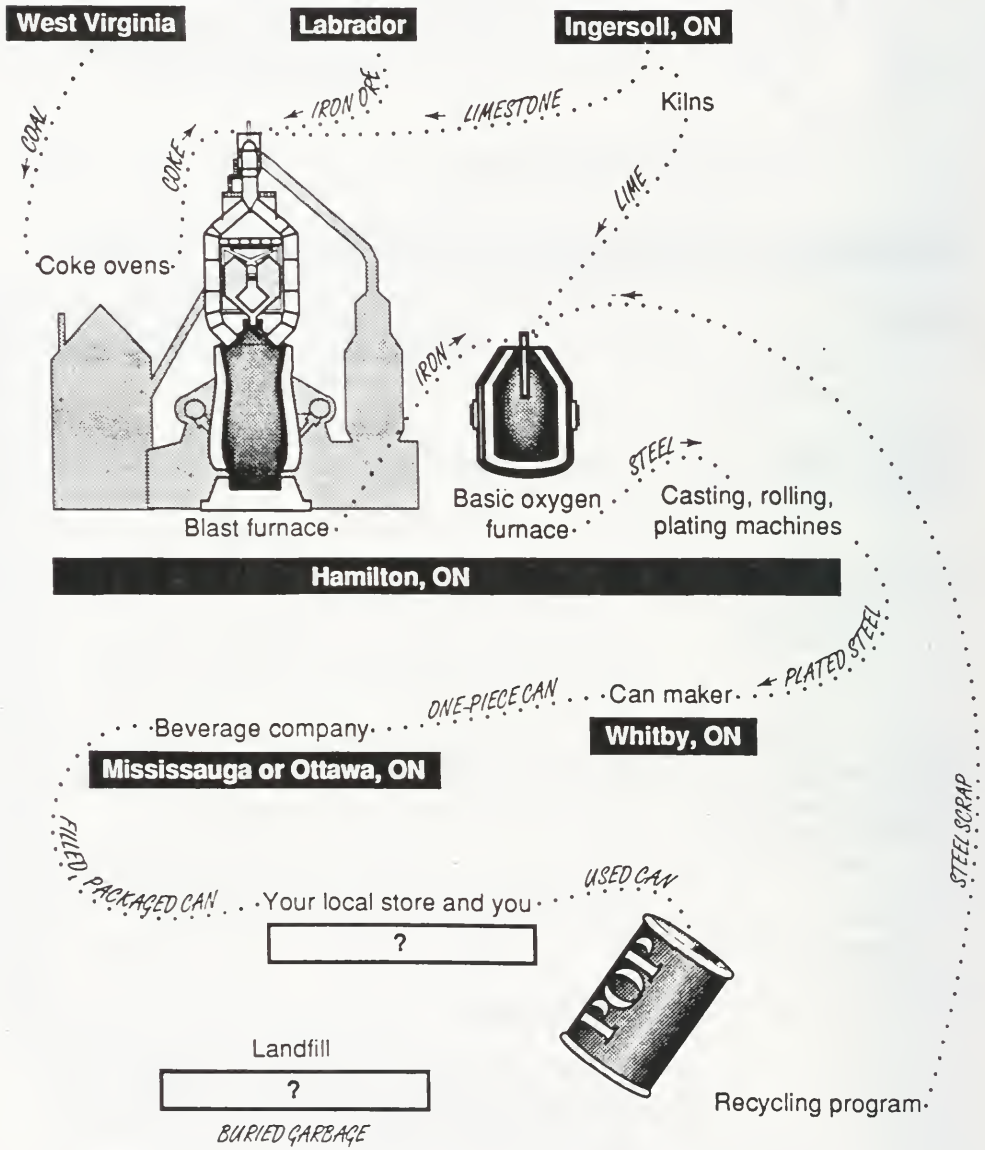
# The Life Journey of One Steel Can




Source: Canadian Steel Can Recycling Council

# Build a flowchart of a product life cycle

*To recognize that, for some products, it is up to the individual to decide whether a product life cycle is a closed or open loop*

## Preparation

This activity may be done individually, in small groups, or by the whole class.

Distribute copies of pages 23 to 24. Discuss or make available the Glossary and the recycling information sheets (p. 9), and the Product Life Cycle Resources and Videos from the List of Resources.

## Procedure

**1.** Point out that there is no single right answer, and explain that **each list contains only one of the natural resources** used to make the product. In the example, for instance, soil, sunlight, carbon dioxide, and water are needed by your garden; but only one (soil) is listed.

**2.** Using the suggested symbols and the given lists, students **draw flowcharts.**

**3.** Students check their work with the answer key (page 25) or compare their flowcharts with other students' and discuss differences.

## Discussion

Which parts of each flowchart are open loops; which closed? Which loop reduces resource depletion and waste?

**Look at the decision box in each flowchart.** Which represents a Consumer Society decision; which a Conserver Society?

## Extension

❦ Students expand the flowcharts, perhaps by adding other natural resources, or draw new ones for other products, based on their own research. They then make up alphabetized lists for the rest of the class to flowchart.

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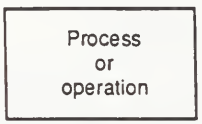
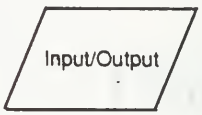
# Flowcharting Life Cycles

A flowchart is a set of symbols that shows a series of operations in a particular order. Here are some commonly used symbols:

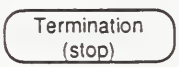
Direction arrows join the other symbols.




At least one arrow in
At least one arrow out



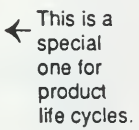

At least one arrow in
At least one arrow out



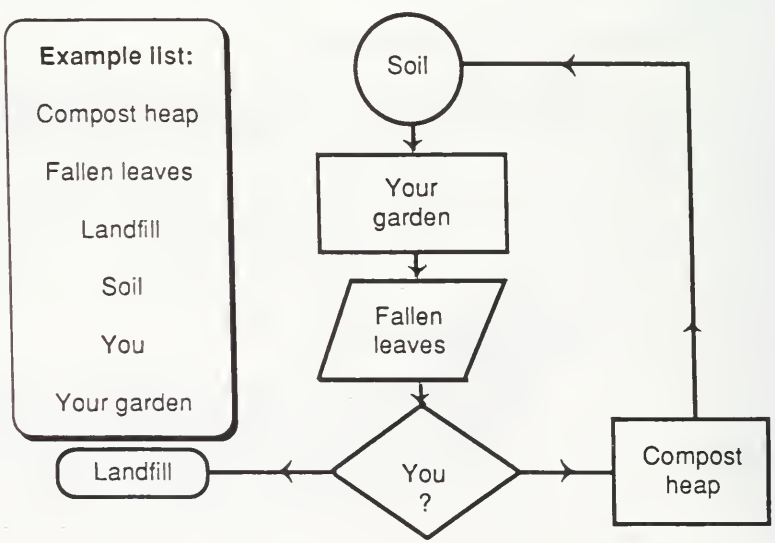

One arrow in

At least one arrow in
At least two arrows out

One arrow out




The sample flowchart below shows the relation between the items in the example list:



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# Flowcharting Life Cycles (cont.)

Draw a flowchart for each list below, showing the relation between the items.

**#1**

Beverage bottling company

Domestic cullet

Glass company

Landfill

Refillable bottle

Limestone

Store

You

Hint: Domestic cullet is from glass that never leaves the glass company.

**#2**

Beverage bottling company

Domestic cullet

Glass company

Landfill

Non-refillable bottle

Recycling collection program

Sand

Store

You

**#3**

Appliance

Appliance maker

Dormant or obsolete scrap

Home scrap

Industrial scrap

Iron ore

Landfill

Recycling collection program

Scrap dealer

Steel

Steel mill

You

Hint: Home scrap is to steel as domestic cullet is to glass.

**#4**

Broke

Envelope

Envelope maker

Landfill

Paper

Paper mill

Post-commercial waste

Post-consumer waste

Recycling collection program

Trees

Waste paper dealer

You

Hint: Broke is to paper as home scrap is to steel.

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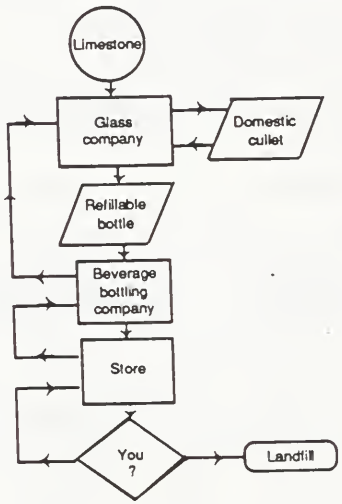
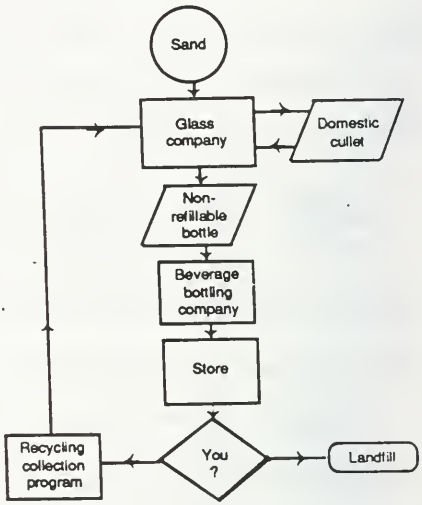
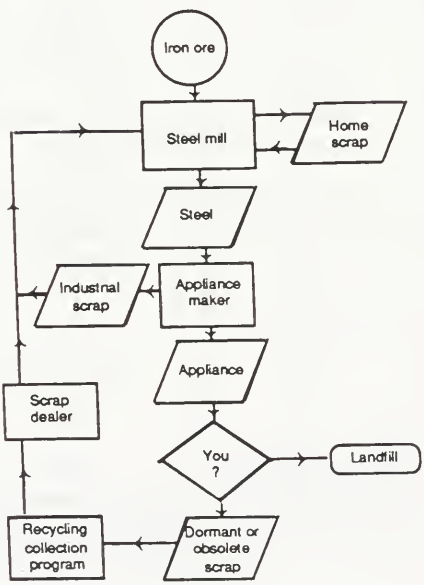
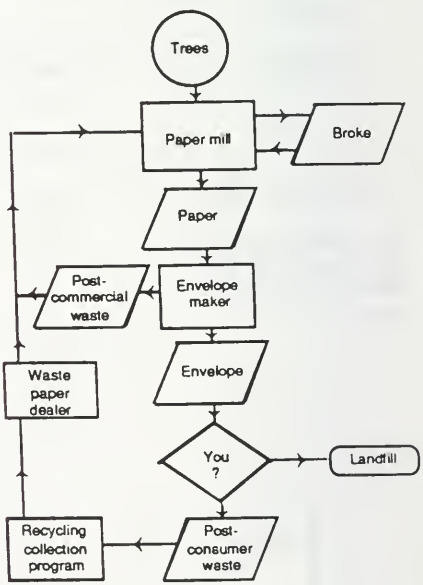
# Life Cycle Flowchart Answer Key



# Simulate a product life cycle

*To increase awareness of the fact that recycling conserves natural resources while reducing waste and pollution*

## Preparation

Make **two sets** of cards (see next three pages).

Form two groups of at least 9 students each. One group simulates the Conserver Society first and the other the Consumer Society. The Conservers use a set of cards **minus** the *Consumer Society Citizen* card, and the Consumers use a set without a *Conserver Society Citizen* card.

## Procedure

1. **Each team assigns the 5 roles** of *Forest Manager, Pollution Control, Landfill Operator, Mill Operator*, and *Citizen* (*Consumer Society Citizen* or *Conserver Society Citizen*). The other students take turns being a *Newspaper*.

2. To start the simulation, a **student takes the *Newspaper* card and reads and follows the directions**. For the first turn, this means going to the Forest Manager, who reads and follows her or his role card directions.

3. The simulation continues according to the role card directions. **When one simulation ends, both groups stop**.

4. **Groups switch**, with the former Conservers becoming the Consumers, and vice versa.

5. **Students compare their simulation results**. Which society used more natural resources? Which created more waste and pollution?

## Extensions

- Based on their own research, students add to the simulation (add an Energy role, or have the Mill Operator, as well as the Citizen, add to the Landfill), or create a simulation for another product (see List of Resources and the recycling information sheets from page 9).

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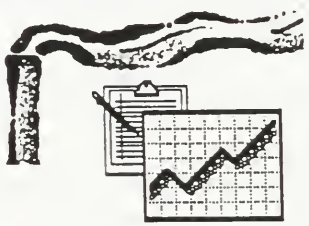
# Cards for the Simulation

## FOREST MANAGER

**Start with 4 *Raw Material Passes.***

- Give a pass to a Newspaper when asked.
- Tell Newspapers to go to the Mill Operator.
- If you have only 1 pass left, call out, "Warning – the forest natural resource is about to run out!"

## POLLUTION CONTROL



**Start with a Pollution Count of 0.**

- Add to the Count as requested by the Mill.
- Keep a record of the Count.
- If the Count reaches 3 or more, call out, "Warning – pollution reaching critical levels!"

## MILL OPERATOR

- Let a Newspaper enter your mill only if it can show a *Raw Material Pass.*
- When a Newspaper enters your mill, ask if it has a *Recycling Coupon.* If so, follow the directions; otherwise, ask Pollution Control to add 1 to the Count.
- Tell the Newspaper to go to the Citizen next.

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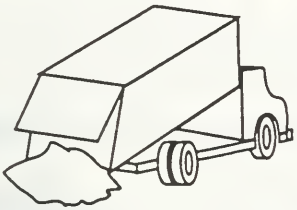
## LANDFILL OPERATOR



- Welcome any Newspaper, and keep it in your Landfill.
- When you have 4 Newspapers, call out, "Simulation ends – landfill full!"

## NEWSPAPER

- If you have a *Raw Material Pass* (given to you by a previous Newspaper), go directly to the Mill Operator.
- If you don't have a *Raw Material Pass*, go to the Forest Manager and ask for one.

- Take the "Newspaper" role card from each Newspaper that comes to you and tell them to go to the Landfill Operator next.
- Pass the "Newspaper" role card on to the next student waiting to be a Newspaper.

**Start with the *Recycling Coupon.***

- Give the first Newspaper that comes to you the *Recycling Coupon.*
- Take from each Newspaper that comes to you, and pass on to the next student waiting to be a Newspaper, the:
  a) *Raw Material Pass*,
  b) *Recycling Coupon*, and
  c) "Newspaper" role card

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# RECYCLING COUPON

To the Mill Operator:

Paper made from recycled waste produces only about 25% as much pollution as paper made from new wood pulp. Ask Pollution Control to **add only 1/4 (0.25) to the Count.**

## RAW MATERIAL PASS

*Wood pulp from a tree.*

This pass good for raw materials sufficient to produce 1 newspaper.

*Recycled newspaper.*


## RAW MATERIAL PASS

*Wood pulp from a tree.*

This pass good for raw materials sufficient to produce 1 newspaper.

*Recycled newspaper.*

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*Wood pulp from a tree.*

This pass good for raw materials sufficient to produce 1 newspaper.

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## RAW MATERIAL PASS

*Wood pulp from a tree.*

This pass good for raw materials sufficient to produce 1 newspaper.

*Recycled newspaper.*

TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Map locations of paper mills

*To explore some of the implications of producing a product from recycled material*

## Preparation

Display two maps of Ontario: a road map and a forest types map (page 76 of the Ministry of Natural Resources' *Focus on Forests,* or *Ontario: Sustainable forestry in Ontario*, listed on page 9).

Provide 30 red map pins and 22 green ones (or any two contrasting types of pins). Make available the list of mills on the next page.

## Procedure

Pairs of students select a mill from the list and mark its location on the **road map**, using red pins for wood pulp-only mills and green pins for mills that recycle waste paper. They then mark the location on the **forest types map**.

## Discussion

1. Consider all the mills first. Discuss their relation to forest types, highways, urban areas, waterways, and railways, e.g. were highways built because of the mills, or vice versa?

2. Then focus on the pattern of red and green pins. Discuss possible reasons for the difference between the locations of the red and green pins (proximity to trees and waste paper, reduced air and water pollution by recycled paper mills).

3. How might a greater demand for recycled paper affect the pulp and paper industry, the single-industry communities marked by the red pins, our forests, and urban areas with waste disposal problems (paper is the largest single component of landfilled garbage)?

## Extension

If there is a mill in your community, find out how much waste the mill produces and recycles.

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# Ontario Pulp & Paper Mills

Abitibi-Price Inc.
- Iroquois Falls
- Thunder Bay

Atlantic Packaging Products Ltd.
- Scarborough ♲
- Whitby ♲

Boise Cascade Canada Ltd.
- Fort Frances
- Kenora

Canadian Pacific Forest Products Ltd.
- Dryden
- Thunder Bay

Domtar Inc.
- Cornwall
- Mississauga ♲
- Red Rock
- St. Catharines ♲
- Trenton ♲

E. B. Eddy Forest Products Ltd.
- Espanola
- Ottawa

James River-Marathon Ltd.
- Marathon

MacMillan Bloedel Ltd.
- Sturgeon Falls

Noranda Forest Recycled Papers
- Thorold ♲

Paperboard Industries Corporation
- Toronto ♲

Proctor and Gamble Ltd.
- Toronto

Provincial Papers
- Thunder Bay

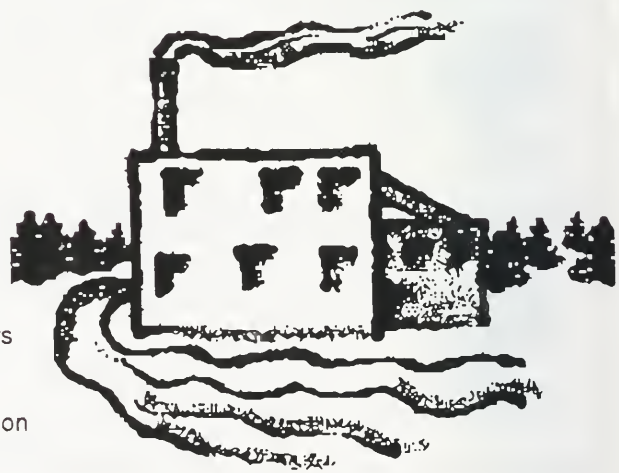
Quebec and Ontario Paper Company Ltd.
- Thorold ♲

Sonoco Limited
- Brantford ♲
- Glen Miller ♲

Spruce Falls Inc.
- Kapuskasing

Strathcona Paper Company
- Napanee ♲

♲ mill uses post-consumer waste paper as a raw material



# Observe leaves in a compost heap

*To observe whether clumping affects leaf decomposition in a compost heap*

## Preparation

If the school does not have a compost heap, directions for building one are available in many of the sources in the List of Resources.

The project may be done with home composters. Students without composters can play a team role such as photographer or recorder.

*CAUTION: Students with allergies or aversions to compost or leaves should wear rubber gloves or play a team role which does not require them to touch the materials.*

## Procedure

1. Read through the Experiment Description with the students. Discuss:

- **Which experimental conditions are the same** for both bags (type and size of leaf, being buried for the same length of time in the same compost heap, etc.)?

- **What's different** about the two bags (single leaf vs. clump of leaves)?

2. **List possible results** in a column (both decompose at same rate, contents of Bag #1 decompose faster than those of Bag #2, and vice versa).

Start another **column headed "Suggests that:"** and give an example: "both decompose at same rate" suggests that "clumping does not affect the rate of decomposition." Ask students to complete the column.

3. Students **conduct the experiment and discuss the results**, referring to the pre-experiment discussion above.

4. If more than one team conducted the experiment, were the results the same? If not, why not (which experimental conditions were different)?

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# Experiment Description

**Purpose:**

An experiment to find out whether clumps of leaves decompose at a different rate than single leaves, in a compost heap.

**Materials:**

- A compost heap.
- 2 bags (knee-high stockings or mesh bags)
- 11 or more small (about 5 cm wide) leaves of the same kind, collected from the same area.

**Preparation of bags:**

1) In Bag #1, place a single leaf.
2) For Bag #2, moisten 10 or more leaves and press them together, one on top of the other, to form a stack or clump of leaves.

**Planting the bags:**

Bury both bags in the same compost heap, selecting areas similar in composition.

Leave the top of each knee-high lying on top of the compost, making it easy to spot the bag later.

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# Experiment Description (cont.)

**Observation:**

a) Every 7 days, carefully dig up the bags.

b) Remove the leaves, trying not to break up or otherwise change the leaves.

c) Record your observations..

d) Put the leaves back in the bags, and plant the bags in the compost again.

e) Continue until the contents of one bag have decomposed too much to observe further.

**Results:**

After the final observation, state the results and what they suggest.

What do you think would happen if you did the experiment at a different time of year or in a different compost heap?

**Applications:**

Based on your results, what tips would you give people who are about to add loads of leaves to a composter?

What tips would you give people whose leaves do not seem to be decomposing?

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# Observation Form

☐ Bag #1–single leaf ☐ Bag #2–clump Date: _____

**Leaf (or leaves) description**

Colour: _____ Size: _____

Smell: _____ Feel/texture: _____

Notes on general appearance:

**Compost heap description**

Dimensions: _____ General appearance & feel: _____

_____

Include a
photograph or drawing
of the leaf or leaves.

TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Observe & identify compost animals

*To observe and identify members of the compost heap ecosystem that can be seen with the unaided eye*

## Preparation

This activity may be done with a composter at school or at home, by individuals, pairs, or small groups of students.

A magnifying glass, some clean, reused jars with lids, a small shovel, and gloves are desirable.

*CAUTION: Students with allergies or aversions to compost or leaves should wear rubber gloves or play a team role which does not require them to touch the materials.*

## Procedure

1. Introduce the idea that **the compost heap is a habitat**; it provides a suitable arrangement of food, water, shelter and space for its inhabitants.

2. Ask students to suggest likely characteristics of compost animals. How would they react to light? What colours are they likely to be? What might they eat?

3. Distribute copies of or display the next three pages. Students **observe their compost heaps, trying to spot the larger invertebrates**. Students are probably familiar with many of the animals they are likely to spot, such as ants, flies, grubs, spiders, slugs, and snails.

4. Using the "Giants of the Compost World" pages and insect field guides that they locate on their own, students try to identify the animals.

## Extensions

- Students create a classification scheme for the animals they find.
- Students place the animals they identify in compost heap food chains.
- Students photograph and draw the animals.

REDUCE
REUSE
RECYCLE

# Observing the Compost World

When you put food and yard waste into a composter, you are adding food and water to the compost **habitat**. The compost inhabitants **decompose**, or break down, the waste. Most decomposers are **microorganisms** (too small to see without a microscope). Here are some tips for spotting some of the "giants" of the compost world:

**1** Lift the cover or top layer of the compost heap and **watch for movement**, since the animals will flee from the light.

**2** Examine the surface carefully, since the animals are very small and may be the same colour as compost.

**3** If you need a better look to identify the animal, **gently scoop it up in a jar**.

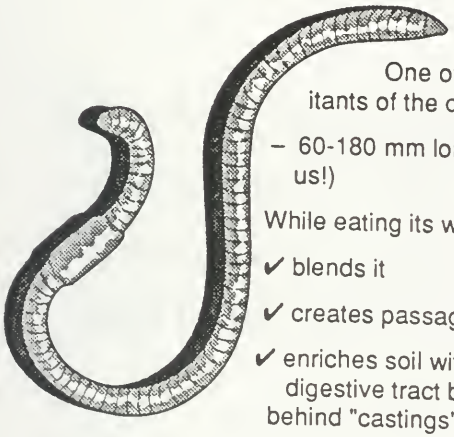
**4** If the animal is still too small to identify, use a **magnifying glass** to see the number and arrangement of legs, feelers, and body segments. Release the animal back into the heap.

**5** **Dig down further**. If your composter has a door near the bottom, open it and remove some compost. Again, watch for animals that run away quickly, and be careful not to harm them.

Finally, wash your hands carefully afterwards. After all, you don't want any compost microorganisms decomposing ***your*** food!

REDUCE
REUSE
RECYCLE

# Giants of the Compost World



## EARTHWORM

One of the largest, most familiar inhabitants of the compost world.

- 60-180 mm long (the ones that live around us!)

While eating its way through compost:

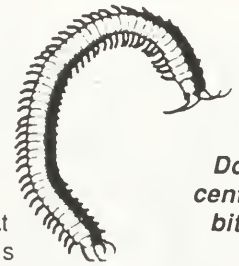
✔ blends it

✔ creates passageways for air and water

✔ enriches soil with microorganisms that live in its digestive tract by eating the soil and leaving behind "castings"

## CENTIPEDE

- 30-50 mm long
- fast moving
- long feelers
- flat body
- 30 or more legs that stick out at the sides



***Do NOT touch centipedes! Their bites can hurt.***

These fierce hunters of the compost heap eat any other creatures they can catch. Their first pair of legs functions as poison fangs.

Ontario centipedes are too small to seriously hurt humans; they play an important role as predators in the compost heap.

REDUCE
REUSE
RECYCLE

# Giants of the Compost World (cont.)

## ISOPOD

- also called sow bug or wood louse
- about 10 mm long
- 14 tiny legs
- moves quickly

## PILL MILLIPEDE

- also called pill bug
- about 8 mm long
- more than14 tiny legs
- shorter feelers than the isopod
- curls up in a ball when disturbed

Isopods and millipedes eat dead plants and animals in compost, breaking up and enriching the soil with microorganisms, much as earthworms do.

## MILLIPEDE

- 8-80 mm
- many short legs, arranged 4 legs per body ring
- short feelers
- round, tubular body
- moves slowly, may coil up when disturbed

Millipedes eat plants and dead compost animals. They break down large pieces of compost. The pill millipede is described separately above.

# Examine smaller compost animals

*To use a microscope to observe members of the compost heap ecosystem that cannot be identified with the unaided eye*

## Preparation

The preceding activity is recommended.

This activity is suitable for individuals, pairs, or small groups of students.

A small amount of **compost**, recently removed from a composter, a transparent **ruler** marked with millimetres, a **magnifying glass**, and a **microscope** are required.

*CAUTION: Students with allergies or aversions to compost or leaves should wear rubber gloves or play a team role which does not require them to touch the materials.*

## Procedure

**1.** Introduce the idea that some of the most important members of the compost heap community are too small to see, even with a magnifying glass. These include fungi (primitive plants that lack chlorophyll and therefore cannot make their own food) and single-celled bacteria.

In this activity, students look for animals that are smaller than those seen in the previous activity, but large enough to spot by eye.

**2.** Students design and **make their own vacuum collectors** (see next page).

**3.** Distribute copies of the two pages following the vacuum collector directions, and review the procedures with the students.

**4.** Students **collect tiny animals from compost and examine them using a magnifying glass and a microscope.**

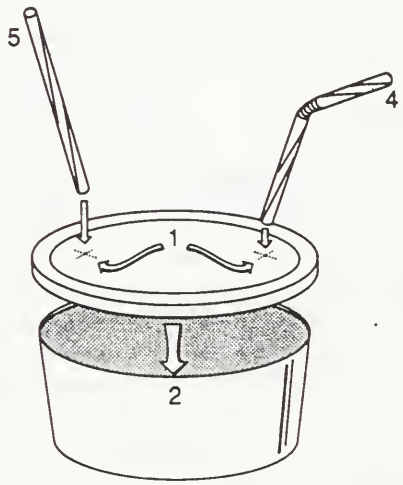
## Extension

- Students compare organisms found in other soil samples to those found in the compost.

REDUCE
REUSE
RECYCLE

# Making a Vacuum Collector

A vacuum collector is handy for catching tiny compost organisms. It's simple to make one, reusing a clear plastic container, as you can see:




1. Cut holes in lid with scissors.
2. Close lid.
3. Insert both parts of a flexible straw that's been cut in two.
4. Aim flexible part of straw at compost organism.
5. Inhale on other part of straw to vacuum up the organism into the container. (*You may want to use a rubber band to hold a piece of stocking over the end of the straw that's inside the container.*)

A glass jar, with holes punched in the lid using a large nail and hammer, works, too (but be sure to remove the lid from the jar before punching holes). Design and build your own!

To get used to using your collector, vacuum up small items like bread crumbs and tiny bits of leaf and soil.

REDUCE
REUSE
RECYCLE

# Magnifying the Compost World

**1** Scoop up some compost in a reused container, such as a margarine tub. Put the lid on until ready to use.

**2** Pour some compost onto a sheet of paper in a shallow box or tray. Using a spoon or scraper, and looking through a magnifying glass, carefully sort through and spread out the compost.

*TIP: Look for movement! That moving speck might be a mite!*

**3** Leave some compost spread out in the original container. Periodically look again, watching for movement.

**4** Use your **vacuum collector** to catch animals; then, remove the lid and observe with a **magnifying glass**.

**5** Using a spoon or scraper, transfer the animal to a microscope slide with a small depression in the middle, and put a cover slide over it.

Observe through the **microscope** and make an accurate **diagram**.

*TIP: To slow down a speedy animal, refrigerate or ice the jar.*

REDUCE
REUSE
RECYCLE

# What You May See

These members of the compost community generally have three important roles:

1. they break down larger materials into soil-size particles
2. they control the bacteria and fungi populations by eating them
3. they help spread these microorganisms through the heap by leaving behind the ones they can't digest and providing "rides" to others

Here's an example of what you might see with a microscope that magnifies an image to appear 100 times as large as it really is:

## MITE

– usually 1 mm or less in length

– difficult to spot, but very common

There are many species of mites, which are related to spiders. One of the largest mites is the tick. The mites you'll find in compost are smaller than ticks; they look like tiny specks of dust.

Some mites eat dead plants and fungi, while others prefer other compost animals, including other mites.

*A few others:*

| Name: | Approx. length: | Look like miniature: |
|---|---|---|
| Enchytraeids (also called potworms or white worms) | 10 - 50 mm | Earthworms (have body rings) |
| Baby isopods | Less than 10 mm | Isopods (but white) |
| Beetle mites | 1 mm | Beetles |
| Nematodes | 0.3 to 1.0 mm | Eels (pointed ends, no rings) |

# Research the local landfills

*To locate and research the local landfills and to calculate how a reduction in waste would affect the projections for full capacity*

## Preparation

Either **locate the local landfill sites** by calling the government office responsible for waste disposal, or assign the task to the students.

## Procedure

1. The **students design a script for an interview**, to be administered either in person or over the telephone, to elicit the information required on the Landfill Data Sheet. Discuss good interview techniques with the students.

2. Selected student delegates administer the interviews.

3. After the data is collected, **students work through the calculations on the data sheet** to determine how reducing the amount of garbage going into the landfill would affect the projected date of full capacity. Discuss the results.

## Variations

- If there are more than a few landfill sites in your area, divide students into groups. Each group is responsible for gathering the data on one landfill.

## Extensions

- **Visit a local landfill**. As well as researching the information for the data sheet, students note the noise levels, traffic flow of trucks, proximity of neighbouring communities, what the garbage being dumped looks like, safety measures, etc.

- Write a report on the results of the research and submit it to a community newspaper.

- Write a letter to a local politician to share the results of the research.

REDUCE
REUSE
RECYCLE

# Landfill Data Sheet

## LANDFILL DATA

Landfill name: _____

Year landfill opened: _____

Capacity of the landfill (in tonnes): _____

Capacity (in tonnes) remaining: _____

Weight of garbage dumped per week: _____ per year: _____

## CALCULATIONS

If current dumping rate is constant, calculate the year capacity will be reached: _____

Calculate the year capacity will be reached if garbage is reduced

by 10%? _____

by 25%? _____

by 50%? _____

## OTHER QUESTIONS

What types of waste are accepted?

How does the landfill deal with leachate and methane?

What monitoring is done (air, groundwater, surface water) in and around the site?

*Add your own!*

# Decide whether a landfill should be built

*Through a cooperative learning exercise, to increase awareness of the issues involved in building new landfills and to emphasize the need to reduce, reuse, and recycle*

## Procedure

**1.** Set the scene: Students are part of an Environmental Assessment Team and must **write a report recommending whether a landfill should be built.**

**2.** Divide the students in the class into **groups of four.** Each of these "home groups" is an Environmental Assessment Team. Label each student in the team as a *1*, *2*, *3*, or *4*.

**3.** Once the groups are formed, **divide the students into 4 large groups** – *1*s, *2*s, *3*s and *4*s. Give the appropriate background sheet to each of the groups. Each background sheet emphasizes a different theme. Students should also be directed to the articles, *The Landfilling of Garbage* and *Incineration of Garbage,* listed in the "Gather Resource Material" activity.

**4.** Each large group studies, discusses, and adds to its case. Students should take **detailed notes** at these discussions so that they will be in a good position to share their knowledge with other members of their Assessment Team.

**5.** After approximately 20 minutes of discussion in the larger groups, **students return to their home groups where they write up their assessment of the situation** using the decision organizer provided. Each member of the team is an expert in one of the four areas and each team member's information is crucial to the decision-making process.

## Extensions

- Students discuss the feelings that arise when:
  - a proposed landfill is within half a kilometre of their farm or house
  - a large sum of money is being offered for their land so that a landfill can be built.

In these discussions, students should address the NIMBY (Not In My Back Yard) dilemma and ways to deal with it.

REDUCE
REUSE
RECYCLE

# Should a landfill be built?

## *Group 1: Selecting a good landfill site*

This area is getting desperate for a new place to put its garbage. The current landfill will reach its capacity in just three more years. The proposed new landfill site satisfies almost all of the criteria for a safe sanitary landfill site. Here are the factors involved:

### PHYSICAL SETTING FACTORS

➡ ***Topography***
(the slope and contours of the land)
This site is perfect because it is moderately hilly with little rain or melting snow running off the slopes.

➡ ***Geology***
(the nature of the ground and soil)
Unlike sandstone, gravel, or bedrock which can crack, the clay base of the land will not easily allow water to flow through it. There is also plenty of soil around for the daily cover.

➡ ***Hydrogeology***
(surface and groundwater)
There is one stream that would have to be diverted, and the water table is deep, minimizing the threat of groundwater contamination.

### ENVIRONMENTAL FACTORS

➡ ***Ecology***
(surrounding vegetation and animal life)
There are no endangered species of plants or wildlife in the area.

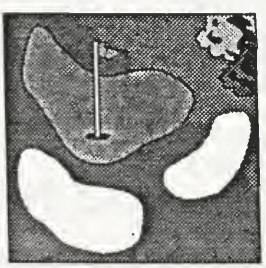
➡ ***Climate***
The climate is moderate, with less than average rain and snowfall.

### LOCAL COMMUNITY FACTORS

➡ ***Location***
The site is 1.5 km from the nearest farmhouse, and 3.5 km from the nearest residential area.

➡ ***Traffic***
A new access road will have to be built to accommodate the large number of trucks coming to the site.

➡ ***Public Acceptance***
The local farming and residential communities are concerned about traffic, pollution, dust, and noise, and are objecting to the site.



### FUTURE FACTORS

A golf course and recreation area will be built on top of the landfill when it is closed.

### ADDED COSTS

Building an access road and diverting the stream will add to the overall cost.

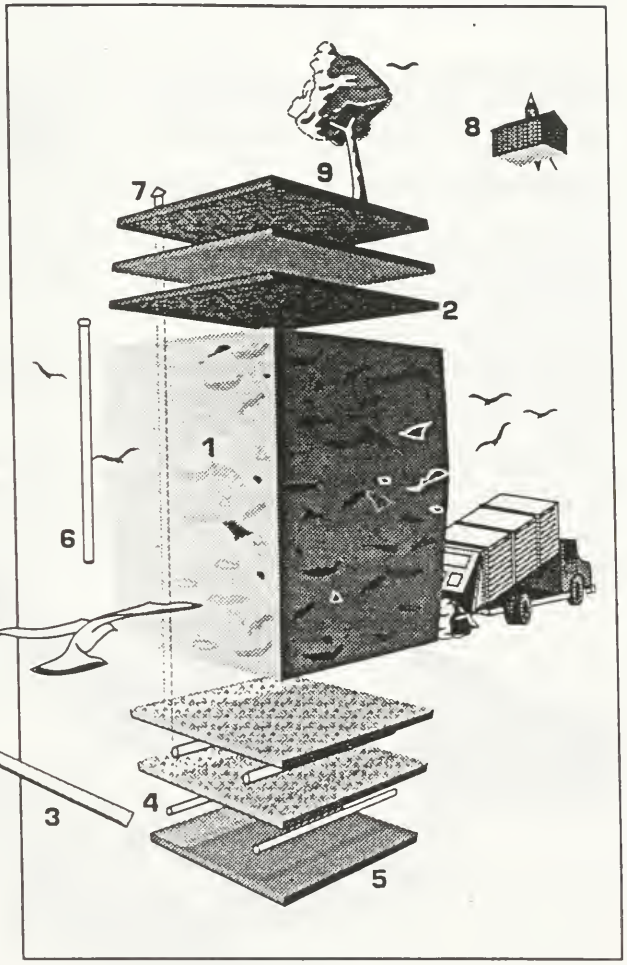
REDUCE
REUSE
RECYCLE

# Should a landfill be built?

## *Group 2: Building a safe sanitary landfill*

The technology of building a safe landfill has advanced since the days of open dumps. Many steps are taken to ensure safe conditions and no adverse environmental effects.

1. The waste is dumped and **compacted** into layers.
2. The waste is **covered daily with a layer of soil**, to prevent odours and blowing litter, and to discourage pests.
3. **Drainage** carries away rain and melting snow.
4. **Leachate is collected** through pipes and treated to remove contaminants.
5. The **base and slopes of the landfill are lined** with clay to prevent leachate from leaking.
6. **Wells are dug** to detect leachate in the groundwater.
7. **Venting shafts** are built to collect methane gas.
8. The methane gas may be used as fuel to **generate energy**.
9. When the landfill closes, a **final layer of soil** is spread over its surface. After the surface settles, the land can be used for recreational purposes. The gas and leachate **monitoring continues**.



REDUCE
REUSE
RECYCLE

# Should a landfill be built?

## *Group 3: Potential landfill problems*

People in the farming community a few kilometres from the proposed site are very upset about having a landfill so near. They have presented the following concerns about the potential dangers of the landfill:

➨ ***Good farmland will be lost,*** and the increased truck traffic and noise may interfere with farm machinery and animals.

➨ ***Leachate,*** which is rain and melting snow that trickles through the landfill, can become highly toxic from hazardous materials in the landfill. It can contaminate nearby wells and lakes.

➨ ***Dangerous methane gas*** is produced as the waste in the landfill decomposes. The gas can cause explosions and other health hazards.

➨ *The large number of trucks entering the site will create* ***noise and pollution.***

➨ ***Monitoring systems will have to be in place for many, many years.*** Because conditions in a landfill do not encourage normal biodegradation (due to very little air), things remain in a landfill for a very long time! Gas production from this slow decomposition could continue for centuries!

➨ ***It's an ugly sight and the garbage has a bad odour.*** Property values in the area will be affected.

➨ *Where there is garbage, there are* ***gulls and pests!*** Gulls can interfere with low-flying aircraft. Rats and other pests are attracted to the site to scavenge.

➨ ***The cost*** *to build and operate the landfill is very high.*

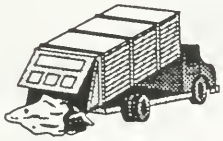
REDUCE
REUSE
RECYCLE

# Should a landfill be built?

## *Group 4: Alternatives to landfills*

There are about 1400 landfill sites in Ontario. By the year 2000, about 250 are expected to reach capacity. What should we do with the garbage that would have gone to those sites? Let's consider the pros and cons of three alternatives to building new landfills. Can you think of any other alternatives?

### *TRANSPORTING THE GARBAGE*



Ontario is a large province! Why not transport our large quantities of garbage in the south to the less populated areas in the north?

➡ There are costs and dangers associated with the long distance transportation of garbage.

➡ The effects of landfilling garbage in northern environments are not known.

➡ It goes against the philosophy that those who create the waste should take the responsibility for its disposal.

### *INCINERATION*

Burning garbage (incineration) is a common method of waste disposal – especially in European cities. It is sometimes called **resource recovery** when, in the process of burning, steam and electricity are generated.

Incineration takes up less land than landfilling does, and has the potential to generate energy. But it has its problems!

➡ Burning causes **air pollution**. Some emissions can be highly toxic.

➡ Although incineration reduces the amount of waste by about 70%, **leftover ash still goes to a landfill.**

➡ In order to make incineration profitable, a constant supply of garbage is required. Paper is especially good. This need for lots of garbage is counter to the philosophy of the 3Rs. It encourages principles of a consumer rather than a conserver society.

The construction of municipal solid waste incinerators has been banned in Ontario.

### *REDUCE REUSE RECYCLE*

The most cost-effective and environment-friendly way of keeping waste out of landfills is to eliminate or reduce that waste in the first place.

➡ Two of the largest components of landfills are paper and organic waste (food and yard waste). If most of our organic waste was **composted**, and our paper **recycled**, a large percentage of waste would be diverted from the landfills.

REDUCE
REUSE
RECYCLE

# Should a landfill be built?

## *Student Team Decision Organizer*

*Each Environmental Assessment Team should complete this form in the most thorough way possible. If you can, record all of the points on either the YES or NO side of the table. Remember however, that it's often the weight you give the individual issues and factors that is crucial – not just the number of points on the YES or NO side.*

| Should a landfill be built at this site? **YES** or **NO** |
|---|
| **THE FACTORS** |
| Physical suitability of the site |
| Environmental factors |
| Concerns of the community |
| Costs and future factors |
| Adequacy of plans and safety measures |
| Alternatives and their pros and cons: |
| Should a landfill be built at this site? If no, is there an alternative? |

# Role play some dilemmas

*To explore through role playing one's commitment to the 3Rs and its effect on others*

## Preparation

Form small groups for this activity.

Copy the dilemma cards on the next page and cut them into individual cards. The cards may be passed from group to group.

## Procedure

1. Students take turns being the lead player. The **lead player takes a dilemma card, reads it aloud to the group, chooses one of the options, and briefly outlines reasons** for the choice.

2. The lead player then **leads a discussion** of the dilemma, inviting others to comment on what they would do, giving their reasons.

3. The lead player asks for a volunteer, and the **two role play** the option chosen by the lead player, **but with the lead player switching places and playing the "other person"** in the dilemma. This role reversal encourages the lead player to look at the situation from the opposite point of view.

4. The lead player asks **other pairs in the group to role play some of the other options**. When a particular option is being role played, the "other person" must be played by a student who chose that option, allowing the student to see the other point of view.

5. Discuss: Have you changed your mind or your approach as a result of the role play? Did the role play suggest any new solutions? Can you state a general principle behind your choice? If everybody acts as you do, what is the result?

## Extension

- Students make up dilemma cards, based upon their own experiences and feelings.

REDUCE
REUSE
RECYCLE

# Dilemma Cards

You notice that a friend is using a Blue Box to store books. Do you:

*A.* do nothing

*B.* tell your friend that it's important to use the Blue Box for recycling, but if that doesn't work, drop the subject

*C.* keep bugging your friend about misusing the Blue Box, even though the friend is annoyed and wants you to stop

*D.* do something else (what?)

You and your friends are deciding where to eat. You object to a restaurant that uses disposable containers, napkins, and utensils, and has huge portions that you can't possibly eat. The majority choose that restaurant. Do you:

*A.* quietly go with your friends

*B.* go along, but point out the amount of garbage being generated

*C.* explain that you don't want to hurt anybody's feelings, but you won't be joining the group to eat this time

*D.* do something else (what?)

A team of student painters is painting the house next door. You notice that at the end of every day, one member dumps paint thinner and leftover paint down the storm drain. Do you:

*A.* tell the person doing the dumping about proper hazardous waste disposal

*B.* tell the supervisor of the painting team what you noticed

*C.* tell the owner of the house what you noticed

*D.* not say anything

*E.* do something else (what?)

# Write a plot outline for a 3Rs TV episode

*To create a fictional scenario, which explores how individuals deal with the 3Rs*

## Preparation

Divide the class into groups of 6 to 10 students each. Give each group a copy of the guide on the next page.

## Procedure

**1.** Each group creates a **story idea for a familiar TV series.**

**2.** The groups produce good copies of the resulting outlines, using a computer, if possible.

**3. Groups review and comment on each others' work.** Do the characters behave like their TV personalities? Does the story seem exciting, interesting, or funny?

## Variation

❦ Although much more difficult, students may create their own characters and settings. If so, they should:

a) Describe three to five main characters in a paragraph: Include name, age, situation, main character traits or goals, and relation to the other characters. Consider each pair of characters. How do they see each other? What do they fight about?

b) Decide on the general setting (it must be a present day setting): Why are all these characters together in one place? Are they a family that lives together in one house? Do they go to school or work together? What is the geographic location?

## Extension

❦ See the next activity, *Write a script for a 3Rs TV episode.*

REDUCE
REUSE
RECYCLE

# Outlining a TV story

## STEP ONE:

Select a TV series you all know, which takes place in the present. **List the regular characters.**

## STEP TWO:

**Start with this form** for your outline:

I. **Opening** scene: **Introduce** the situation – a main character starts a campaign to make everybody "Reduce, Reuse, Recycle."

II. **Middle** scenes: The **complications**

III. **Final** scene(s): How the situation is **resolved** or ends.

## STEP THREE:

**Begin brainstorming**, starting with the following questions:

***The opening:***

✐ Which main character is most likely to start a 3Rs campaign?

✐ How would that character try to introduce the campaign to the others?

***The complications:***

✐ How do the characters' main traits cause them to react to the campaign and the person that started it?

✐ Which character is LEAST likely to care about the 3Rs? Who would have the hardest time reducing? Who is most likely to resist reusing?

✐ What if the campaign starter slips up and fails to follow the 3Rs?

✐ What if somebody only pretends to support the campaign?

Focus on conflicts: conflicts between characters; conflicts between ideal goals and real life difficulties; conflicts within a character, what we try to achieve and what we really do.

***The resolution:***

✐ Could a character learn a lesson by dealing with a complication?

✐ What kind of events might cause characters to change their minds (a landfill being built nearby, admiring an outfit that turns out to be reused clothing, etc.)

✐ What kinds of actions would show these changed attitudes?

## STEP FOUR:

**Build up the outline.** Choose your favorite resolution; circle the complications leading to it. If there are less than 3, choose others, to total about 4 middle scenes.

Arrange the scenes so that each complication is more difficult and tension-filled than the previous one.

# Write a script for a 3Rs TV episode

*To create a fictional scenario, which explores how individuals deal with the 3Rs*

## Preparation

Do the preceding activity. The same groups continue with this activity.

Give each group a copy of the guide on the next page.

## Procedure

**1.** Each group **writes a script, based on a previously created story outline.**

**2.** The groups produce good copies of the resulting scripts, using a computer, if possible. Using the chalkboard, **suggest the following form:**

SCENE #:

A sentence or two describing the location.

CHARACTER 1
What character 1 says.

CHARACTER 2
*(if necessary, a description of an action)*
What character 2 says.

For example:

SCENE 1:

At the end of the school day, RAJ and ANNE are sitting on the front steps of the school, waiting for MIKE.

RAJ
You'd better hide that plastic bag before Mikey gets here.

MIKE
*(appearing at the top of the steps)*
Before who gets here?

## Extensions

- Stage a performance (of course!), complete with costumes and props.
- Produce a videotape of the episode. Arrange for location shooting and editing, if possible.

REDUCE
REUSE
RECYCLE

# Writing a TV script

## STEP ONE:

Read the opening scene idea from your story outline. Jot down events and feelings that you want in the scene and how it should end.

## STEP TWO:

**Assign everyone a character**. If there are more students than characters, several can work together.

Think of how your character sounds and behaves in the TV series. Try to become your character. In this scene, what is your goal? What is your main emotion?

## STEP THREE:

**Begin improvising** – pretend you are the character and start talking. A few tips:

- ☛ Start right into the action, the introduction of the 3Rs campaign; don't let the audience switch channels.
- ☛ Don't let one character go on for too long. To get things going, limit everyone to one sentence, then it's another character's turn.
- ☛ React to what is said or what has just happened.
- ☛ Stay in character. Imagine how the TV character would react.
- ☛ Improvise actions, not just words.

At the end of the scene, jot down the improvised dialogue and action.

## STEP FOUR:

**Begin revising.** Look at the notes from Step One. Did the scene end as planned? Did the planned events take place? If not, improvise a new scene, with these points in mind.

Look for places to improve.

**Cross out dialogue that:**

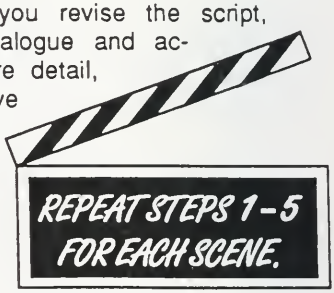
- ✘ repeats points already made
- ✘ doesn't relate to the main actions
- ✘ doesn't sound natural
- ✘ doesn't show the goals or emotions of the characters

**Add:**

- ✔ humor
- ✔ gestures or expressions that you associate with a character
- ✔ obstacles or conflicts between characters that make them react strongly

## STEP FIVE:

Each time you revise the script, write the dialogue and actions in more detail, until you have a finished script.



TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Use percents & graphs with waste statistics

*To apply percent calculation and data graph creation and interpretation skills to a waste management topic*

## Preparation

This activity is suitable for use as an individual exercise. It may also be conducted as a group or class exercise as follows. Omitting question 5 makes the exercise significantly easier.

## Procedure

**1.** Explain that the table is a percent breakdown by **type of material** of the 4.05 million tonnes of household waste disposed of in Ontario in 1989. An additional 5.36 million tonnes came from industrial, commercial, and institutional sources.

**2.** Ask some of the class or small groups to do the exercise by **creating a pictograph**, some a **horizontal bar graph**, some a **vertical bar graph**, and some a **circle graph**.

**3.** Students present the resulting tables and graphs, and discuss any discrepancies or differences of interpretation.

## Answer guide

**1.** 75% of 17% = 0.75 x 17% = 13%

**2.** 80% of 16% = 13%  15% + 2 = 8%

13% + 8% = 21%

**3.** 15% of 19% = 3%  60% of (7% + 7%) = 8%

25% of 6% = 2%  3% + 2% + 8% = 13%

**4.** 13% + 21% + 13% = 47%

**5.** (Remaining 4% newspapers) + (remaining 53% of all waste) = 8% of new total.

38% paper (8% newspapers), 6% yard wastes, 13% food, 6% metals, 6% glass, 8% plastics, 6% diapers, 4% wood & building supplies, leaving 13% other (1% household hazardous waste).

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# What Do We Throw Away?

The following is an estimate of the kinds of household waste that we dispose of in landfills. The figures are percentages by **mass**.

Create a graph with this information!

| | |
|---|---|
| Paper and paperboard (includes 17% newspapers) | 36% |
| Yard wastes | 16% |
| Food | 15% |
| Metals | 7% |
| Glass | 7% |
| Plastics | 6% |
| Diapers | 3% |
| Wood & building supplies | 2% |
| Other (includes 0.6% household hazardous waste) | 8% |

1. If a major campaign to recycle newspapers **reduced the newspapers being disposed of by 75%**, what would that be as a percent of the total (all waste)?

2. If a major effort to distribute home composters and organize central composting were to succeed in **reducing yard wastes by 80% and food waste by half**, what would that be as a percent of the total?

3. If a major campaign by the packaging industry to increase Blue Box participation were to succeed in **reducing paper and paperboard waste <u>other than newspapers</u> by 15%, metals and glass by 60%** each, **and plastics by 25%**, what would the overall effect be as a percent of the total?

4. If **all three** campaigns above were to succeed, what would the effect be as a percent of the total?

5. Prepare a new table and graph showing the resulting percent distribution of waste if all three campaigns succeeded. Are the major reductions that resulted from the campaigns revealed by looking at the two tables or graphs?

# Form a hazardous waste events chain

*To identify sources of hazardous wastes and their effects on the water cycle and food chain*

## Preparation

Copy and cut out enough sets of cards to distribute to the students. Students without cards can be "judges." If the number of students exactly matches the number of chain cards, the activity works just as well without judges.

## Procedure

1. **Shuffle** the cards and give one to every student who is not a judge.

2. Students walk around and **locate the other links** in their hazardous waste events chain.

3. When a chain feels that it is complete, it approaches the judges and **each link, in sequence, reads its card**. If the judges disagree, the group must go back and reassemble. When all of the chains are correctly formed, each chain reads out its card sequence.

4. After doing the activity "cold", students may want to repeat it with the cards reshuffled.

## Discussion

The discussion can focus on two themes: The first is to **identify the hazardous waste link** in each of the chains and to discuss what could have been done or substituted to avoid the negative consequences. **The second theme is more values oriented**; students discuss how willing society would be to accept products that do not cause hazardous waste, but may result in not so perfect fruits and vegetables, lawns that aren't so green, laundry that's not whiter than white, and manufactured goods that cost more.

## Extensions

- Students write or draw their own hazardous waste event chains.

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# Hazardous Waste Chain Cards

START
9 cards

There is strong consumer demand for perfect looking fruits and vegetables.

In the 1950s and 1960s, farmers sprayed DDT on the crops to kill insects.

Rain washed the DDT into the waterways.

Tiny organisms called plankton absorbed the DDT.

Little fish ate the plankton.

Big fish ate the little fish.

Bald eagles ate the big fish.

Bald eagles laid eggs with shells so thin that the eggs broke before hatching.

The population of bald eagles declined.

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# Hazardous Waste Chain Cards

START
7 cards

Household cleaners, paint thinners, and photographic chemicals are dumped down the drain.

The sewage treatment process does not destroy all toxic chemicals.

Sludge from the sewage treatment tank is used to fertilize fallow fields.

The grass is contaminated with the toxic chemicals.

Cows graze on the grass in contaminated fields.

The milk from the cows is rejected because of contaminants.

The farmer's dairy business goes bankrupt because the milk can't be sold.

START
5 cards

Old batteries, paint, and art supplies are thrown out with household garbage.

The garbage is taken to a landfill.

Heavy metal, lead, and other toxic chemicals get into the leachate.

The leachate seeps into groundwater.

Local well water is found to be contaminated.

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# Hazardous Waste Chain Cards

START
6 cards

Liquid waste is discharged from industries along the St. Lawrence Seaway.

Fish in the St. Lawrence River are found to have high levels of toxic chemicals in their fat cells.

Beluga whales in the St. Lawrence eat the fish.

Beluga whales in the St. Lawrence die at an increasing rate.

Autopsies on dead beluga whales reveal extreme contamination from heavy metals, DDT, and PCBs.

Dead beluga whales have to be disposed of as hazardous waste.

START
5 cards

Consumers use heavy-duty laundry detergent and bleach.

The phosphates in the detergents pass through the sewage treatment plants.

Phosphorus causes blue-green algae to grow very quickly in lakes.

The "blooms" of algae die and the decomposition uses up a lot of the oxygen in the water.

Fishermen notice that the fish stocks in the lake are down.

# Survey the community about a local issue

*To survey and analyze the community's knowledge and practices related to a local waste management issue*

## Preparation

As the students progress through the stages of this activity, be prepared to discuss simple survey techniques, samples, and valid comparisons.

## Procedure

1. Through class discussion, **students identify an important local garbage issue** (e.g. Blue Boxes, landfills, hazardous wastes, etc.)

2. Using the sample survey as a guide, **the class creates a one-page survey** to determine the community's knowledge and attitudes in relation to the identified issue.

3. **Students administer the survey** to a few family members and friends. Surveys can be administered over the telephone. To save paper, students ask the questions verbally, and record the answers on a single tally sheet, allowing one column of data per respondent.

4. **Students tabulate the results** identifying trends, relationships and differences among the groups.

## Variations

- At the survey development stage and data analysis stage, divide into groups and assign a few components to each group.

## Extensions

- **Write an article** based on the results of the survey. Submit a few of the best articles to the community newspaper.

- **Compile a list of *Did you know...* facts** related to the subject of the survey. Send this along with the article to the newspaper, or post it around the community and school.

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# Community Survey

## *Sample survey*

**Questions:**

1. Does the community know the facts about composting?
2. Do people compost? If not, why not?
3. What is the attitude towards composting?
4. Do people of different ages, genders, and types of housing have different responses?

*Before developing the survey, clearly state the questions to be addressed by the survey.*

### Mini Survey on Composting

Age: ❑ under 19 ❑ 19-30 ❑ 31-60 ❑ over 60
Gender: ❑ Female ❑ Male
Housing: ❑ House ❑ Apartment ❑ Farm

*Get a profile of the respondents. They are your sample.*

1. Which of these items would you not put in a compost pile?
   - ❑ grass cuttings
   - ❑ leftover meat
   - ❑ vegetable peelings
   - ❑ ashes from a fireplace

*Survey the knowledge about your subject.*

*Questions should cover basic facts only, be clearly stated, and preferably, be of the multiple choice variety. (They're easier to answer, record, and analyze later.)*

2. When materials have composted, what is the result?
   - ❑ mold
   - ❑ humus soil
   - ❑ bone meal
   - ❑ all of the above

3. If the average household composted all of its yard and kitchen waste, the household garbage would be cut down by approximately: ❑ 10% ❑ 35% ❑ 75%

4. Does your household have a compost pile?
   - ❑ yes ❑ no

*Determine the current practice and the reasons for it.*

5. If you don't compost, what is the reason?
   - ❑ don't know enough about it
   - ❑ don't want to buy a composter
   - ❑ don't have a place for it
   - ❑ other? *(Please specify)*

6. Everyone should have a composter.
   - ❑ strongly agree
   - ❑ agree
   - ❑ disagree
   - ❑ strongly disagree

*Survey the general attitude.*

*Allow at least one open-ended question where respondents can add their comments on issues not covered in the previous questions.*

7. Any comments on composting?

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# Community Survey

## *Sample analysis*

*Go through the surveys and record the responses to every question on a master tally sheet. Count up the totals.*

*Look for the answers to your original questions:*

***Does the community know the facts about composting?***

*Look at questions 1, 2, and 3:*
*22 out of 30 (73%) got #1 correct;*
*20 out of 29 (69%) got #2, and only*
*16 out of 30 (53%) got #3.*

*You could total the three questions to get the result of 58 correct answers out of 89 responses = 65%.*

***Do people compost? If not, why not?***

*Look at questions 4 and 5:*
*16 out 30 (53%) people said they composted. Of the 14 who said "no," 6 said it was because they didn't know enough about it.*

***What is the attitude towards composting?***

*Look at question 6. All but two respondents agreed that everyone should have a composter.*

***Do people of different ages, genders, and types of housing have different responses?***

*You must do more counting to answer these questions. Unless you have a computer, you have to tally up the totals for each group separately.*

*continued on next page...*

### Mini Survey on Composting - Master Tally Sheet

# of respondents = 30

Age: 6 under 19 | 8 19-30 | 8 31-60 | 8 over 60

Gender: 19 Female | 11 Male

Housing: 21 House | 9 Apartment | 0 Farm

1. Which of these items would you not put in a compost pile?
   - 1 grass cuttings
   - 22 leftover meat
   - 0 vegetable peelings
   - 7 ashes from a fireplace

2. When materials have composted, what is the result?
   - 1 mold
   - 20 humus soil
   - 2 bone meal
   - 6 all of the above

3. If the average household composted all of its yard and kitchen waste, the household garbage would be cut down by approximately: 8 10% | 16 35% | 6 75%

4. Does your household have a compost pile?
   16 yes | no 14

5. If you don't compost, what is the reason?
   - 6 don't know enough about it
   - 1 don't want to buy a composter
   - 1 don't have a place for it
   - 6 other? *(Please specify)*
     *too much trouble, too messy, too smelly*

6. Everyone should have a composter.
   - 8 strongly agree
   - 20 agree
   - 2 disagree
   - strongly disagree

7. Any comments on composting?
   - *tried composting, but found it too much work*
   - *been composting for years, and it really helps my soil*
   - *too many flies around the composter – I don't like it etc.*

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# Community Survey

## *More analysis and a sample write-up*

### Mini Survey on Composting: Examples of Interesting Group Comparisons

**Knowledge** (Questions #1, # 2, #3)

% giving correct answer: whole group: **65%**
under 19: **57%** 19-30: **51%** 31-60: **54%** over 60: **75%**
females: **68%** males: **55%**
house: **71%** apartment: **44%**
use a composter: **81%** don't use a composter: **42%**

**Use of a composter** (Questions #4, #5)

Whole group: **53%** use one
under 19: **45%** 19-30: **40%** 31-60: **60%** over 60: **75%**
house: **67%** apartment: **22%**

**Attitudes** (Question #6)

No big differences between groups.

*Sample Analysis (cont.)*
*Comparing groups:*

*Let's look at an example:*
*To compare results for people of different ages, divide the surveys (or the columns of data) into four piles – one for each of the age groups. Then tally up the results for each group.*

*Compare the results with the ones you got for the whole group.*

*Look for patterns, and interesting questions to pursue that you didn't think of at the start. For example, in this survey, it's interesting to compare the knowledge and attitudes of those with composters to those without.*

*Pick out an interesting result for a headline.*

*Your first paragraph should answer four basic questions (who, what, where, why) about the survey. It's wise to state the sample size (the number of respondents).*

*Briefly, present the results.*

*Add a quote or include a human interest angle.*

*Conclude with a highlight.*

### Community Agrees: Everyone Should Compost!

Students from grades 8 and 9 at Centennial Middle School conducted a neighbourhood survey about composting. They surveyed 30 households (21 houses and 9 apartments).

More than half of the households had a compost pile. Of the respondents who lived in houses, 67% used a composter. Those who didn't compost had a variety of reasons. The most frequently mentioned was lack of information.

The knowledge about composting varied. People who had composters were more knowledgeable, and so were respondents who were over 60 years in age. One 95 year old man said "I've been composting for years. Why do you think I have the best-looking garden on the block?"

The attitude towards composting was very clear: 28 out of 30 respondents felt that <u>everyone</u> should have a composter.

TEACHING ABOUT GARBAGE
tag
THE TRANSITION YEARS, MODULE 3

# Make signs for community garbage cans

*To provide students with an opportunity to take action in increasing community awareness of garbage*

## Preparation

Inform the Municipal Offices, the local mall management company, or appropriate building managers that students are carrying out this activity to encourage the community to be conscious of garbage, and in particular, recycling.

## Procedure

1. **Locate some prominent garbage cans** in the community (in a mall, along a main street, in a town hall or arena).

2. **Identify the closest locations to these garbage cans where recyclable materials** (e.g. cans, glass, newspaper) **can be deposited.**

3. **Make large signs** with words or pictures to deter people from throwing in recyclable materials and to encourage them to place them in appropriate recycling bins. Use previously used materials for the signs (e.g. corrugated)!

4. Students go out in groups and **place the signs on or next to the garbage cans.** Check with local authorities (e.g. Fire Marshall) to ensure safe and appropriate placement of the signs.

## Extensions

- As well as putting up signs, **decorate the garbage cans** to draw attention to them.
- **Take photographs of the garbage cans** with the signs.
- Contact someone from the local media or send the photographs to the media to **gain publicity.**
- **Write a letter** to the municipality, mall management office, or building manager to encourage them to set up easily marked locations for recycled cans, glass, and newspaper.

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# Sample Garbage Can Sign

# Write a book report

*To encourage students to read and analyze books with an environmental theme or message*

## Preparation

Give the book list to the school or local librarian to determine which books are available and suitable for the reading level of the students. The librarian may know of additional books.

## Procedure

1. Present a list of the selected materials to the students.

2. Students choose a book for their report. (It is possible that there may not be enough books to go around, so students may have to read them sequentially.)

3. **Students write a book report stating the environmental theme** found in the book and how it related to the story.

## Variations

- It is possible that the list of readily available books will be short. In this case, you may wish to assign a group of students to a single book. It is the responsibility of the group to produce one book report.

## Extensions

- **Students write a short story** with an environmental theme. Here are a few suggestions:

  • an item now found in landfills becomes valuable in the future

  • a garbage expert travels through time and attempts to solve garbage problems in the past and future

  • a tiny organism in a compost pile grows to a gigantic size

  • an item is passed from person to person and affects each owner's life differently

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# Book List

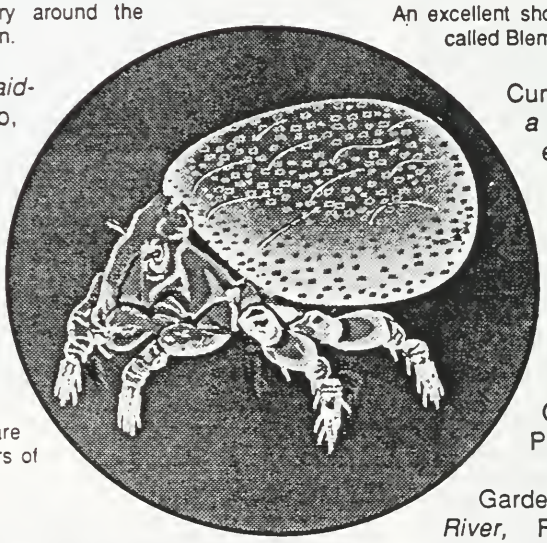
## Easier Fiction

Bunting, Eve. *Blackbird Singing*, Apple Paperback, Scholastic Inc, 1980
Beautiful blackbirds congregate near Marcus' home with interesting consequences on family life.

George, Jean Craighead. *Who Really Killed Cock Robin?*, Clarke Irwin, 1973
An ecological mystery around the sudden death of a robin.

Haynes, Mary. *Raider's Sky*, Lothrop, Lee & Shepard, 1987
An environmental disaster wipes out the adult population and the Children's Concern takes over.

Norton, André. *Outside*, Blackie & Son, 1976
Kristie and Lew are among a few survivors of a polluted earth.



Collier, James Lincoln. *When the Stars Begin to Fall*, Delacorte Press, 1986
Harry takes on the local carpet factory which is polluting the river.

Christopher, John. *Blemish*, in Tales out of Time, edited by Barbara Ireson, Faber & Faber, 1979
An excellent short story about a town called Blemish.

Cummings, Betty. *Let a River Be*, Atheneum, 1978

Dillard, Annie. *Pilgrim at Tinker Creek*, Harper, 1974

Fisher, R.L. *The Prince of Whales*, Carroll and Graf Publishers, 1985

Garden, Nancy. *Peace O River*, Farrar, Straus, & Giroux, 1986

## Fiction

Aaron, Chester. *Spill*, a Margaret K. McElderry book, Atheneum, 1977
A family attempts to save the lagoon adjacent to a bird sanctuary after an oil spill occurs.

Bond, Nancy. *The Voyage Begun*, a Margaret K. McElderry book, McClelland Stewart, 1982
Paul and Katie explore life in a community threatened by environmental problems.

George, Jean Craighead. *Water Sky*, Irwin Publishing, 1987
Lincoln learns about cooperation with nature when he investigates the threatened extinction of the bowhead whales in Alaska.

Hughes, Monica. *Invitation to the Game*, Harper Collins, 1990
Senior students, bored survivors of a polluted world, are invited to play in an unusual game.

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# Book List (cont.)

Hughes, Monica. *Ring-Rise Ring-Set,* Julia MacRae Books, 1982
Liza stows away to the snowfields with a scientific expedition investigating threatened world climate change.

Hughes, Monica. *The Tomorrow City* Garden House, 1978
A computer, "C-Three", takes over a city and disposes of everything considered old and useless.

Janes, J. Robert. *Danger on the River,* Clarke Irwin and Company, 1982

Siegel, Robert. *Whalesong,* Harper Collins Publication, 1981
A classic fable of Hruna, the humpback whale, and his journey through the waters.

Smucker, Barbara. *White Mist,* Irwin Publishing, 1985
Two teenagers travel back in time to investigate environmental destruction and the forced eviction of Great Lakes Indians.

Spinelli, Jerry. *Night of the Whale*, Little Brown and Company, 1985
While partying at the beach, a group of high school seniors find beached whales.

Wyndham, John. *The Day of the Triffids*, Fawcett Crest, 1951
A classic sci-fi where triffids, a form of plant life, cause terror.

## Non-Fiction

Asimov, Isaac. *Space Garbage*, Library of the Universe, Gareth Stevens, 1989
This book aimed at young adults would be very appealing to space buffs.

Donnelly, Judy & Kramer, Sydelle. *Space Junk*, Morrow Junior Books, 1990
This book is also very interesting, aimed at young adults, and would be very appealing to space buffs.

Harlan, Judith. *Sounding the Alarm*, Dillon Press, 1989
A biography of Rachel Carson, the founder of the modern ecology movement.

Lee, S. *The Throwaway Society,* An Impact Book, Franklin Watts, 1990
A thorough treatment of the waste problems in the United States, this book is aimed at young adults and is a good reference book.

Pringle, L. *Throwing Things Away: From Middens to Resource Recovery,* Thomas Cromwell Junior Books, 1986
This is an excellent resource book for students. It contains a brief history of garbage and presents good information on landfills and other waste disposal alternatives.

# Project Cards

## Description

The TAG Project Cards are suggested topics for independent student learning. They are suitable for individuals or for small project teams.

Opportunities should be provided for students to present the results of their completed projects to the class, school, or community at large. Encourage students to contribute articles based on their projects to school or local newspapers, to create bulletin board or poster displays, or to deliver "guest lectures" to other classes.

## Preparation

The Project Cards may be copied, cut out, and glued to used pieces of boxboard or cardboard to increase their durability. They may then be made available to students in a TAG Projects box or folder.

## Garbage Through the Ages

Compare and contrast the way modern Canadian society deals with garbage with the way an earlier Canadian community (e.g. Native communities, early settlers in Upper Canada or New France) dealt with garbage. Use the following "organizer" to structure your report.

| | Societies | |
|---|---|---|
| Categories of comparison | Modern | Earlier Community |
| | practice of 3Rs | |
| | food preparation & food waste | |
| | clothing | |
| | durability of goods | |
| | use of resources | |
| | personal responsibility for waste management | |
| | *Add your own!* | |

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# Waste: More than a Household Word

Ontario households throw away more than 4 million tonnes of garbage every year, but industries, commercial establishments, and institutions generate even more waste – over 5 million tonnes, in fact!

Take a closer look at the kinds of waste produced by an industry, business, or institution in your community. Some places to consider:

- ❒ your school
- ❒ the largest factory in town
- ❒ businesses where you, your friends or your family members work
- ❒ businesses that make or sell some of your favorite things

Invite a speaker, write for information, or arrange a visit.

Find out: what waste is created, where it goes, how much it costs to dispose of it, what is being done to reduce, reuse, and recycle.

REDUCE
REUSE
RECYCLE

# Garbage That's Out of This World

At one time, people thought that we might solve our garbage problem by sending our waste into space. Further research revealed that space has a garbage problem of its own!

To get started, here are two books on the problem:

*Space Garbage*
by Isaac Asimov
Library of the Universe, Gareth Stevens Publishers

*Space Junk*
by Judy Donnelly and Sydelle Kramer
Morrow Junior Books

# Garbage Archaeology

Archaeology is the study of the "antiquities" or remains of earlier societies. Some researchers even dig into old landfills to study how our garbage reveals information about our society. These researchers are known as garbage archaeologists or "garbologists." One of the most famous is William Rathje, who has examined the contents of landfills across North America.

Here are some sources to get you started on a garbage archaeology project:

"Once and Future Landfills" by William J. Rathje
in *National Geographic*, May 1991

"Rubbish!" by William J. Rathje
in *The Atlantic Monthly*, December 1989

*The Archaeology of Garbage* by William Rathje
Harper Collins

# Careers in Waste Management

The field of waste management has many interesting career possibilities. A few examples are:

environmental engineers (design and operate solid waste facilities)
hydrologist (performs groundwater studies)
planner (plans the community facilities)
economist (investigates the finances of waste management)
collector/hauler (collects waste)
communications coordinator (designs and delivers programs to the public through a variety of media)
waste reduction coordinator (coordinates waste reduction efforts for companies, municipal governments, and public institutions)

For this project, locate people with jobs related to waste management and interview them to get more details about their work and the required training. If possible, arrange for one of the people to speak to the class.

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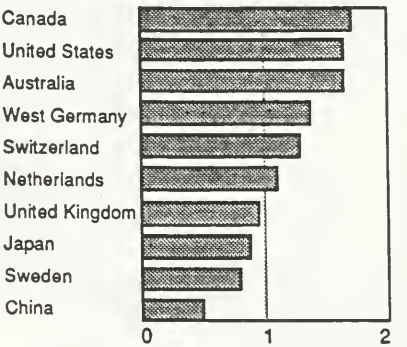
# What We Waste: A World of Difference

Canadians are among the biggest "wasters" in the world, throwing out an average of 1.7 kg per person per day (including waste from commercial facilities – it's about 1 kg/person/day without it.)

Research the waste management practices in other countries. Find out the extent to which they use landfills, incineration, and practice the 3Rs. How are their waste management practices affected by the geography of the country, the population density, the wealth of the country, and the cultural values?




*Environment Canada, 1990*

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# Garbage Headlines

For a topic that nobody wants to discuss at the dinner table, garbage seems to get more than its share of headlines. Keep an eye (and earl) out for stories about garbage in local and national newspapers, and television and radio newscasts.

When you come across a story:

- notice how many sources report it and how important it seems
- cut out printed articles and try to tape TV or radio reports
- review the reports looking for bias, point of view, facts that are reported differently, etc.
- try to contact some of the people involved, an expert on the subject, or local people with similar experiences

Based upon your own investigation, how would you rate the media news coverage? How would you report the story?

REDUCE
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# It's a gas!

Methane seems to pop up all over the place: it's a garbage gas, a greenhouse gas, a grazing gas, and the main component of natural gas!

Find out more about methane:

- read about its characteristics
- build a model of a methane molecule
- check out the cow connection
- research methane's role in global warming
- check out the "mining for methane" project at Metropolitan Toronto's Brock West Landfill

See what you can find out about methane energy projects from Ontario Hydro, the Ontario Ministry of Energy, and Energy, Mines and Resources Canada.

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# "Don't read that trash – write it!"

Ever wonder what it would be like to be a steel can? Well, here's your chance. Write a story from the standpoint of an inanimate object, or describe life in the compost heap from the viewpoint of one of the tiny inhabitants. Here are a few ideas:

- *The Story of My Life* by A. Steel Can
- *Life in the Landfill* by Chuck Steak (with contributions by "Juice" Box)
- *Both Sides Now: Memoirs of a Full and Satisfying Life* by Natasha Notepaper
- *My Previous Incarnations* by Seymour Glass
- *Competition in the Compost Heap: The Mite Eats Mite Life of a Decomposer*

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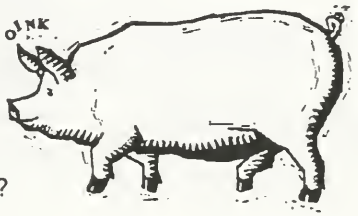
# Food for Thought

With so many people suffering from hunger, it seems especially bad to waste food. Research the topic of food waste. Here are some questions to explore:

- ○ How does food waste affect farmers? Be sure to include farmers who raise animals that can eat leftover human food, as well as farmers that grow food.
- ○ How do supermarkets and food transporters deal with spoiled food?
- ○ What happens to all that leftover food at restaurants and cafeterias?
- ○ What happens to ***your*** leftover food?




Try to include interviews or visits with people at local restaurants, food stores, farms, farmers' markets, and food distribution warehouses.

REDUCE
REUSE
RECYCLE

# Pick Your Own

You can get lots of great ideas for projects from books about waste management and the environment. Here are a few suggestions:

*The Canadian Junior Green Guide*
by Teri Degler and Pollution Probe

*Earth Book for Kids*
by Linda Schwartz

*The Kid's Green Plan: How to write your own plan to save the environment*
by Janet Grant

*Looking at the Environment*
by David Suzuki

*Trash Attack!*
by Candace Savage

# List of Resources

The following list is limited to resources that are *easily available* from bookstores, public or school libraries, government agencies, commercial vendors, and other organizations.

There are additional resources available free from the Ministry of the Environment, Environment Canada, and the Recycling Council of Ontario. These are all listed in the activity *Gather resource material about garbage*. Your municipal or county Waste Management Office also has information and pamphlets on the 3Rs and may have materials specifically developed for educational purposes. Local industries are often a good source of materials on how waste management issues relate to their industry and your community.

## Resource Materials

**focused specifically on waste management**

*Earth Day Every Day: Waste Management*
E. Sakamoto & J. Gershman, McGraw-Hill Ryerson, 1990

This book is a collection of cross-curricular activities for intermediate students. Curriculum and difficulty indexes are included, and the information is based on Canadian statistics. Available from McGraw-Hill Ryerson for $21.00 Call 1-800-565-5758 and quote #07-551278-5.

*Hazardous Waste Education Kit*
The Federation of Ontario Naturalists, 1985

This kit was developed in cooperation with the Ontario Waste Management Corporation. It includes a teacher's guide, five subject units, and other handbooks and maps. It is very detailed and is aimed at teachers of intermediate or senior level students. Available for $55.00 from the Federation of Ontario Naturalists, 355 Lesmill Road, Don Mills, Ontario M3B 2W8 (416) 444-8419

# List of Resources (cont.)

*Solid Waste Management Education Kit*
Metropolitan Toronto Works Department's Solid Waste Environmental Assessment Plan, 1991

This kit was designed for Metro Toronto teachers. It includes two excellent activity books, and the NIMBY board game and simulation. The activities are cross-curricular and suitable for Grade 6 and up. For information, contact Metro Works, Metro Hall, 55 John St., Station 1180, Toronto, Ontario M5V 3C6 (416) 392-3753.

*Waste Reduction and Recycling Curriculum Package: Elementary and Secondary*
Recycling Council of Ontario, 1987

The Recycling Council of Ontario distributed these excellent curriculum packages to all schools in Ontario during Recycling Week 1987.

## Resource Materials
**which include waste management topics**

*The Environmental Math Workbook*
E. Sakamoto, Courseware Solutions Inc., 1992

This book contains an excellent collection of math activities for intermediate level students. Many of the activities have a waste management theme. Difficulty level, math subject areas, and environmental issues indexes are included. Available for $19.99 from Courseware Solutions Inc., Suite 404, 100 Lombard St., Toronto, Ontario M5C 1M3 (416) 863-6116

*Home and Family Guide: Practical Action for the Environment*
Harmony Foundation of Canada

This book contains a detailed discussion of environmental issues and how citizens can take action to deal with them. Available for $7.50 from the Harmony Foundation of Canada, Suite 501, 225 Metcalfe St., Ottawa, Ontario K2P 1P9 (613) 230-7353

# List of Resources (cont.)

*Keepers of the Earth: Native Stories and Environmental Activities for Children*
M. J. Caduto & J. Bruchac
Fifth House Publishers, 1989

Although not directly dealing with garbage, this is an interesting collection of short North American Native stories with environmental themes, followed by associated activities. It is available at most libraries.

*Ranger Rick's NatureScope; Pollution: Problems and Solutions*
American National Wildlife Federation, 1990

Aimed at American teachers, this book has an excellent collection of activities for intermediate students on environmental issues, including a good section on waste management and water pollution. Available from the American National Wildlife Federation, 1400 16th St. N.W. Washington, D.C.

*Women and the Environment*
Ontario Advisory Council on Women's Issues, 1990

This book presents a practical discussion of environmental issues with a focus on women's issues. For more information, contact the Ontario Advisory Council on Women's Issues, 5th Floor, 880 Bay St. Toronto, Ontario M7A 1N3 (416) 326-1840.

## Product Life Cycle Resources

*Farming Canada's Forest*
*From Watershed to Watermark*
*The Urban Forest*
Canadian Pulp and Paper Association

These are three interesting brochures on the process of paper manufacturing and recycling. Available free from the Canadian Pulp and Paper Association, Public Information Office, Sun Life Building, 19th Floor, 1155 Metcalfe St., Montreal, Quebec H3B 4T6 (514) 866-6621

# List of Resources (cont.)

*Glass Information Kit*
Consumers Glass

This kit covers topics such as the story of glass and how glass is recycled. Available free from Consumers Glass, Public Affairs, 777 Kipling Ave. Etobicoke, Ontario M8Z 5A4 (416) 232-3000

*Steel – Canada's Most Recycled Material*
Canadian Steel Can Recycling Council

This kit about steel is specifically for educators. Available free from the Canadian Steel Can Recycling Council, 1330 Burlington Street East, P.O. Box 2460, Hamilton, Ontario L8N 3J5 (416) 521-1375

*The World of Alcan*
Alcan Aluminum Ltd.

This booklet and map outline the aluminum-making process, and emphasizes Alcan's world-wide network. It is available from Alcan Aluminum Ltd., 1188 Sherbrooke Street West, Montreal, Quebec H3A 3G2

## Product Life Cycle Videos

*Glass Works: The story of glass recycling*
VHS, 11:30 minutes

This video presents a short description of how glass is made and how it is recycled, with specific reference to the Ontario Blue Box program. Available from Consumers Glass, Public Affairs, 777 Kipling Ave. Etobicoke, Ontario M8Z 5A4 (416) 232-3000

*Steel Goes Full Circle: Steel Can Recycling*
VHS, 11:20 minutes

This video shows how steel is made, with an emphasis on the important role of recycled steel scrap and the recyclable nature of steel. Both the Ontario Blue Box program and the process

# List of Resources (cont.)

of recovering and recycling steel cans are described. Available free from the Canadian Steel Can Recycling Council, 1330 Burlington Street East, P.O. Box 2460, Hamilton, Ontario L8N 3J5 (416) 521-1375

## General Waste Management Videos

*Pulling Together*
VHS, 15:50 minutes

Created for the Industrial/Commercial/ Institutional sector, this video emphasizes the responsibility of business in dealing with the solid waste management crisis. Several Ontario companies' recycling initiatives are highlighted. Available on loan from the Metropolitan Toronto Works Department, Station 1180, 21st Floor, Metro Hall, 55 John St., Toronto, Ontario M5V 3C6 (416) 392-9052, or recycling coordinators in Peel, Waterloo or Guelph.

*Solid Waste Management*
VHS, 10:20 minutes

This video illustrates the technology and operation of Metro Toronto's sanitary landfill sites. Even though the landfill is in Toronto, this video is appropriate across Ontario as the subject is discussed so clearly. Available on loan from the Metropolitan Toronto Works Department at the address and phone number above.

*The Second Time Around*
VHS, 11:30 minutes

This video was produced by Halton Region and focuses on its Blue Box recycling program. Although regional, it's a good 3Rs video, with school-age children sorting recyclables in several scenes. Available on loan from the Waste Reduction Coordinator, Regional Municipality of Halton, Public Works Department, P.O. Box 7000, 2360 South Service Rd. W., Oakville, Ontario L6J 6E1 (416) 825-6000

# List of Resources (cont.)

*The Garby Video: Garby, Garbage, Blue and You!*
VHS, 18:00 minutes

This engaging video is "For Grades 1-8, or anybody who has ever thrown anything into a garbage can without thinking!" Produced by students (through the grassroots group Environmental Action Ontario, with funding from the Ontario Ministry of the Environment) and starring students, it is a lively look at how to reduce garbage from a kid's point of view. Available for a donation of $20 to Environmental Action Ontario, P.O. Box 899, Station P, Toronto, Ontario M5S 2Z2 (416) 929-2499